An Introduction to THE MAMMALS OF PENNSYLVANIA

By

Leo A. Luttringer, Jr.
In Charge of Education

Photograph by Henry R. Casey, Germantown, Pa.

A Monroe County Buck with antlers in the "velvet."

FOREWORD

BIG AND LITTLE BROTHERS OF THE WOODS

WILD animals are wild only when they are thought about and treated as such. When they are regarded as friends, or when they have not been treated as enemies, they act like friends. It goes without saying that they are very much more interesting to people generally as tame friends than as wild creatures which look upon people as enemies.

The more we know about the creatures of the wilds, the more we understand that they have characters, dispositions, habits, and individualities very much as people do. The closer we get to them the more we like them and the more we get out of them.

I hope this little book will make many people better acquainted with our big and little brothers of the woods and fields.

PREFATORY NOTE

This little bulletin is by no means intended to be a complete reference work. Space would not permit such a treatise, consequently the descriptions of the mammals and the various notes concerning them have been made as brief as possible.

While the majority of the photographs were taken by representatives of the Game Commission, several were kindly loaned by the Biological Survey, Washington, D. C., and Professor S. H. Williams of the University of Pittsburgh whom I take this opportunity of thanking.

The author wants also to thank Dr. Witmer Stone, of the Philadelphia Academy of Sciences, Mr. Earl L. Poole, of the Reading Public Museum and Professor S. H. Williams, for making their notes accessible to our use.

The faunal map also is a contribution from Prof. S. H. Williams and constitutes the latest treatise on the life-zones now available in the Commonwealth. In fact it represents the first comprehensive study made since 1903. Incidentally, it is rather a coincidence, and a most fortunate one, that Professor Williams should have been appointed a Member of the Board of Game Commissioners soon after the appearance of the first edition of this bulletin. His supervision of future works of this sort will be invaluable.

I am deeply grateful to Honorable Francis H. Coffin, Member of the Board of Game Commissioners, and Dr. Thomas E. Winecoff, In Charge of Research for the Game Commission, for their aid in reviewing the manuscript finally.

To Mr. R. A. McCachran of the Bureau of Refuges and Lands of the Game Commission is credited the preparation of the animal tracks chart which was reproduced from photos appearing in Professor Williams' Mammals of Pennsylvania and E. W. Nelson's Wild Animals of North America.

While most of the bulletin is original, the author desires to emphasize the fact that the chapter on general descriptions is a compilation of numerous reference works, substantiated in many cases, of course, by our own notes.

LEO A. LUTTRINGER, JR.

Harrisburg, Pa.
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INTRODUCTION

Humanity, as it surges here and there throughout our vast Commonwealth, in crowded streets, busy faetories, stuffy offiees, sweltering mills, and gloomy mines, leaves various impressions upon the one who stands aside for a moment to observe it. Most people of these modern days, to all outward appearanees at least, are so engrossed in earning a livelihood or pursuing worldly pleasures of one sort or another that one is almost led to believe these things eonstitute all their earthly desires. But sueh is not the ease. The yearning for the more beautiful and finer things of life is beeoming more and more apparent as the years go by. The multitude seeks respite from the average things that go to make up their every day existenee, and in so doing their paths invariably lead them into the Great Out Doors.

Pennsylvania, spoken of as it is as The Industrial Titan, has mueh to offer those who seek the wonders of Nature. Many forms of wild life are to be found in her fields, woods, and mountains. Myriads of streams harbor an abundanee of fish, and wild flowers are present everywhere in eountless numbers.

In this meehanieal age the longing for more frequent contaets with the marvelous properties of Nature are more readily fulfilled through the use of sueh ageneies as the automobile, and the establishment of magnifieent roads which lead to the very heart of the mountain fastnesses.

And so, while to the easual onlooker the masses appear not to be interested in these things, this little bulletin is prepared in an effort to satisfy the overwhelming demands of an ever inereasing number of nature enthusiasts throughout the Commonwealth. Spaee does not permit a treatise of all of our wild ereatures; therefore only the mammals are diseussed.

MAMMALS—WHAT THEY ARE

Mammals are warmblooded creatures belonging to that group of the animal kingdom known as Vertebrates, which possess a segmented spinal column, or backbone. The entire group of vertebrates includes the fishes, amphibians, reptiles, birds and mammals. Of these, mammals are the only creatures having hair, and they also differ from the other forms in that the young are fed at the breasts or mammae, from which the name *mammal* is derived.

MAMMALS FOUND IN PENNSYLVANIA

The mammals of Pennsylvania are grouped into six orders, namely: Marsupialia—Opossums; Chiroptera—Bats; Insectivora—Moles and Shrews; Carnivora—Dogs, Wolves, Foxes, Bears, Minks, Weasels, Raccoons, Skunks, Otters, and Cats; Rodentia—Rats, Mice, Squirrels, Woodchucks, Beavers, Porcupines, Chipmunks, Rabbits, and Hares; and Ungulata—Deer, Cows, Horses, and Pigs. However, in this little treatise the creatures are not classified scientifically; they are grouped according to the relative positions they occupy in the conservation program of the state, for in this manner they can best be studied by the masses. Under this system the groups will be classified under four headings: Game Animals; Fur-bearing Animals; Predatory Animals; Other Animals.

LIFE ZONES

The term Life-zone is used by scientists in referring to a region where environmental conditions so react upon each other as to form a suitable home for certain plant and animal life. There is no definite boundary of a life-zone, and such boundary as does exist is determined by temperature, rainfall, soil, altitude, drainage, and many other factors. All of these things bring about a certain average condition which is favorable to certain species of plants, birds, mammals, and so forth.

In Pennsylvania there are three or four life-zones. One, prevalent in the southern and southwestern counties, has been called the Upper Austral or Carolinian Life-Zone. In much of the State occurs the Transition Life-Zone which is very irregular. In the higher mountains is to be found the Canadian Life-Zone.

The Canadian Zone is the most northerly and extends into Warren, Forest, Jefferson, McKean, Elk, Clearfield, Potter, Cameron, Clinton, Tioga, Lycoming, Sullivan, Bradford, Susquehanna, Wyoming, Lackawanna, Wayne, and Pike Counties. It also includes the higher parts of Erie, Clarion, and Indiana Counties and stretches along the Allegheny Mountains into Fayette, Westmoreland, and Somerset Counties. The northern part of Cambria and some sections of Blair, Bedford, and Centre Counties are also included in the Canadian Zone.

The Transition Zone occupies a large part of the northwestern area of the State, the valleys between the great uplifts of the Appalachians and the less mountainous parts of the eastern end of the State. It includes most of Erie County, Crawford, Mercer, Lawrence, Venango, Butler, Beaver, Armstrong, Clarion, Indiana, and a small part of Allegheny. The Laurel and Chestnut Ridges of the mountains in Fayette and Westmoreland Counties are questionable, but undoubtedly lie chiefly in this zone. The sections of Cambria and Somerset be-

tween the mountain ridges and also parts of Blair, Bedford, Centre, Fulton, Huntingdon, Mifflin, Franklin Juniata, Snyder, Union, Montour, Northumberland, Columbia, Luzerne, Schuylkill, Lebanon, Lehigh, Monroe, and a part of Berks are all within the Transition Zone.

Within the Transition Zone exist scattered areas of both the Canadian and Carolinian Zones. The more southerly forms not infrequently occur on the lower edge of the Canadian Zone and certain northern species extend occasionally into the Upper Austral Zone.

The Austral (Carolinian) Zone comprises the southwestern counties of Greene, Washington, Fayette, Westmoreland, Allegheny, Beaver, and the southeastern counties of Lancaster, Chester, Philadelphia, Cumberland, York, Montgomery, Adams, and Bucks. There is an evident progressive northward migration of both plants and animals in the Susquehanna Valley, as well as in certain sections of the western part of the Commonwealth.

MAMMALS AND THE EARLY SETTLERS

Man's natural desire to kill either for food, for safety, or for sport the wild creatures about him has been manifest throughout countless ages. And his one time ignorance in permitting this instinct to assert itself improperly resulted so disastrously in many instances that devastation and famine followed in its wake. It was only after the most costly experiences that Man learned that any undue interference with the balance of Nature would react most unfavorably to his plans, even to the extent of affecting his supply of food, shelter, and clothing.

All creatures, when properly controlled, have their rightful place in the scheme of Nature. Before the White Man settled Pennsylvania, and even for some time afterwards, a great assemblage of animal life, and the necessary natural foods to sustain it, were abundant. There was an almost perfect balance between the beneficial and destructive varieties of mammals. Predators, even though plentiful, did not seriously deplete the ranks of the more beneficial creatures, and the Indian, no doubt, took an even toll of both good and bad forms.

When the White Man came, however, conditions changed materially. Game became a principal food, and also furnished material for wearing apparel. Deer hides provided much clothing for the early settlers, and from them were made buck-skin jackets, moccasins, etc. Raccoon pelts were highly prized and for a long time 'coon-skin caps were in vogue among the early pioneers. As population increased and communities developed, the need for additional food and clothing was imperative. As a result a heavy toll was taken, chiefly of the more valuable creatures. Forests were cut down to provide material for dwellings and cleared areas upon which to raise crops, and so little by little, much valuable food and cover for the wild life was destroyed. Such magnificent creatures as the bison were gradually forced westward; packs of gray wolves and solitary panthers soon disappeared.

By this time the State was already fairly well settled, and Man, once established and assured of a fair livelihood, looked for ways and means of deriving a profit from the vast resources round about him. Thus many pioneers began to kill game for market purposes, and as their greed grew they even led the Indian to kill for them, by offering in exchange various cheap trinkets so highly prized by the Red Man.

"Fire-water" (whiskey) often served as a medium of exchange for game and fur in later days.

The enormous toll of game creatures taken by the early settlers, in addition to those accounted for by the predators, was keenly recognized about forty years ago (1890). The State was practically "shot out," and only a handful of the once splendid array of wild life remained. White-tailed Deer were on the verge of extermination; there was a pitiful supply of Cottontail Rabbits, Squirrels, and other game creatures present.

Laws for the protection of any wild creatures at that time were few. The citizens of Pennsylvania today may never appreciate fully the ardor and labors of the few far-sighted conservationists of forty years ago, who, despite one difficulty after another, eventually brought into being in 1895 a Board of Game Commissioners composed of six men, which had for its goal the bringing back, to some degree at least, of the wealth of wild life that formerly existed. This Board, (since increased to eight men) was confronted with a gigantic task—a task to be accomplished only with enthusiasm born of the highest sort of altruism and the most intense devotion to a cause. And, with its organization, conservation of our wild animals really began in earnest.

CONSERVATION LAWS

The fact that the Board was dealing with a region wonderfully varied and almost ideally located geographically for the protection and development of game life was one great advantage in restoring it to abundance. While lumbering interests and forest fires had swept most of the mountains of their trees, some forests remained, and the wild areas were potential game propagating plants. The mountains, parts of them rugged and wild, were an admirable home for deer and bear. The climate was favorable, food-bearing plants were abundant, and, what is more, the average citizen of Pennsylvania soon caught the spirit of conservation and tried to cooperate. Had Pennsylvania's native wildernesses offered less, the results would certainly not have been so gratifying.

One of the first moves of the Commission was the stopping of market hunting. Too long had Pennsylvania markets been so glutted with deer and other game creatures that innumerable carcasses had to be burned. A law passed on June 4, 1897, stopped the chasing of deer with dogs, a practice which was a chief factor in depleting the herd. At the same time the first definite attempt to stop the sale of game was made. Prior to 1897, the markets of such large cities as Philadelphia, Pittsburgh and New York were glutted with innumerable carcasses of Pennsylvania deer. In 1905 a game refuge law was passed and the first refuge in a system which has grown to magnificent proportions was established in Clinton County. Today, there are 34 primary, 68 auxiliary, and 9 secondary game refuges in the state, comprising over 100,000 acres where wild life is safe at all times. All game refuges are surrounded by public hunting grounds, and as the creatures within the refuges increase, they spread over the adjacent public hunting territory where they become legal prey to the hunter.

As a result of a law passed in 1905, black bears were protected.

Pennsylvania was the first state to recognize the Black Bear as a creature relatively harmless, yet at the same time thrilling as a game animal. In protecting bears, steel traps, dead-falls, pits, and snares were declared illegal. In 1907 the General Assembly brought into being the famous "Buck Law" which protected for the first time in the history of the Commonwealth all female White-tailed Deer. This move met with a great deal of opposition from sportsmen who had for years regarded the wily doe as game fully as worthy of the hunter as the most experieneed buck. The year 1907 also marked the passage of a law prohibiting the use of automatic shotguns. In 1909 a law was passed preventing the owning of shotguns and rifles by aliens, and later this act was amended to prohibit them from owning pistols or dogs.

Probably the most important single step in the development of Pennsylvania's present system was the passing of the Resident Hunter's License Law in 1913. Already the leaders in the work foresaw that the natural enemies of the game would have to be controlled in a business-like fashion; they foresaw that a large and effieient body of men would be needed if Pennsylvania's forests and fields were to be properly patrolled. The 1913 Resident Hunter's License Law brought into being at one step a fund sufficiently large to permit the hiring of more men, the acquiring of more lands, and the bringing in of game animals from outside of the Commonwealth to replenish our decreasing supply.

In 1917 the Auxiliary Game Refuge Law was passed. This law permitted the Game Commission to lease the hunting rights to lands and made possible the establishment of refuges in parts of the Commonwealth where small game needed protection.

Although lands were being acquired continuously since 1913, the General Assembly did not authorize the Game Commission to purchase them until 1919. Subsequently the first tract was bought in Elk County in 1920. To date there has been purchased approximately 300,000 acres.

It is a matter of general information that there exists in nature a balance which is reached after competition and struggle by all living things. If left undisturbed this balance is maintained. Some species prey upon certain other species, and, when the latter become reduced or increased in numbers, their natural enemies become less or more numerous, in like proportion. Obviously, man, with his increased power for killing, is the most dangerous factor in this scheme of nature, and, either through ignorance, or carelessness of the results of such interference, he has killed indiscriminately. The early settlers killed game in vast quantities, and paid little attention to the control of the predators, with the result that the latter increased tremendously and helped man to further reduce the valuable creatures. Today, the situation is vastly different. Thousands of sportsmen go afield in Pennsylvania every year and kill a vast amount of game. To prevent predators from increasing to such proportions that they will still further deplete the game supply, the sportsmen control these game-killers through an effieient bounty system, which while effective, at the same time must not be sufficiently severe to threaten any of the creatures with extermination. The first effective "Bounty Law,"

which permitted the paying of a certain sum of money to citizens of the State who had killed various animals destructive to game, and who had placed their work on record by sending the dead animal or its skin into the office for examination, was also created in 1913. According to this bounty law as it was originally conceived, $4.00 was to be paid for each wild cat, $2.00 for each gray fox, $2.00 for each weasel, and $.50 for each goshawk, sharp-shinned hawk, and great horned owl. The bounty law in this form was in force for only two years. In 1915 certain modifications were effected, bounty on hawks and owls was dropped, and from 1915 to 1921 a bounty of $1.00 was paid on minks.

Civilization always demands the absolute control or extermination of any animal which directly threatens human life; therefore, the gray wolf and cougar of Pennsylvania long ago had to retreat before civilization. Today we do not seek to exterminate any form of wild life. In spite of the fact that since 1913 bounty has been paid on the wild cat or bay lynx, this creature still occurs in considerable though decreasing numbers. Bounties paid by the Commission at the present time are as follows: Wild Cat, $15.00; Gray Fox, $4.00; Weasel, $1.00. (A bounty of $5.00 is also paid on the Goshawk between November 1 and May 1.)

The discretionary powers delegated to the Pennsylvania Game Commission over a period of years have made possible easy solutions to serious local game problems which otherwise would have involved the entire state. Since 1915 the Game Commission has been empowered to close counties to the killing of any kind of game, when necessary. In 1925 the additional authority to regulate seasons and bag limits was also delegated.

All of these major conservation laws and innumerable others, together with the establishment of sensible seasons and bag limits for all game, were responsible for making Pennsylvania one of the greatest game states in America.

ECONOMIC VALUE

When we speak of the economic value of our mammals we think of their relationship with Man, with other creatures, and with the fields, woods and streams in which they live. In early days live stock was not raised extensively for food, and consequently game became a staple product to be bought or sold along with vegetables or grain. In the present day Man depends less upon mammals for food, it is true, but on the other hand many mammals are providing a splendid source of revenue for him through the value of their furs. It has ever been so, and we need only to review history for a moment to realize what a magnificent part mammals played in the settlement of our great country. Pursuit of the bison and trapping the beaver were two chief industries in early days, and perhaps were bigger factors in the establishment of settlements and communities than the subsequent gold rushes.

Many game animals are taken in Pennsylvania each year. From fifteen to twenty thousand deer are killed. Over three million cottontail rabbits find their way into the larders of Pennsylvania housewives, and at least a million squirrels, forty to fifty thousand raccoons, and several hundred black bears also add their weight to the four or five

thousand tons of game taken each year. The value of the game killed in Pennsylvania annually is conservatively estimated at from six to eight million dollars. In addition the value of the fur-bearing animals taken annually amounts to from two to two and a half million dollars. Such animals include muskrats, skunks, raccoons, minks, opossum (classed as fur-bearers under the law), and red and gray foxes, weasels, and wild cats, which while trapped extensively for their furs, are classed as predatory animals. Although the meat and fur value of the game is very great, perhaps its value from the recreational standpoint is even greater.

Aside from furnishing meat and fur, mammals have a still more important value to Man, one that he sometimes dangerously lessens when he kills too many of any species. This value results from their relationship with other creatures. Thus Man dare not kill too many game creatures, because such a reduction, in addition to that effected by their natural winged and four-footed enemies, would eventually exterminate them. On the other hand, Man must ever be careful not to exterminate any one species of predator, for though they take game, they also devour other small mammals that are destructive to forest trees, forest crops, etc. And Man should never forget that the so-called destructive species of mammals weed out the runts and weaklings of more desirable forms. This process of elimination serves admirably to prevent the weaklings from perpetuating an even weaker race. Isn't it true that some of our best loved game creatures are more or less destructive in a sense? Do not the deer sometimes damage crops? Has the rabbit never girdled trees, and the raccoon destroyed the eggs of game and other valuable birds? Does not even his majesty the bear sometimes kill sheep and destroy bee-hives? Surely we cannot draw the line anywhere and be fair. Just as certain creatures destroy rats and mice, for instance, so do these little rodents destroy many noxious insects. And it must be remembered that the burrowing of mice has an economic value from an agricultural standpoint, in that these activities are considered to improve drainage and an increased growth of vegetation. They supplement the work of earthworms by bringing the sub-soil to the surface and carrying vegetable matter into the underground burrows.

When we speak of the economic value of our mammals we must also bear in mind the winged predators which prey upon much game and many rodents. We mention this simply to cite the hawks and owls as an agency which needs to exist upon the same foods as many of our mammals, and consequently has a decided bearing on the abundance and scarcity of mammals if these winged predators are not kept in check. Here again, however, we must remember that to keep in check does not mean to exterminate, and that a reasonable proportion of our raptorial birds must be spared to help combat any excess of rodent life which may occur.

One of the worst agencies for the destruction of many kinds of mammals is the house cat. Here is a creature which takes much valuable game, and at the same time many rats and mice. When he is properly fed and controlled he is a valuable ally of the farmer. When he is left to roam the woods and fields half-starved, however, he is a serious menace to the small game animals, and birds.

Next we have the relationship of mammals to the areas in which

they live. We can easily see how the improper control of any one species will react unfavorably upon the growth of crops, fruit trees, forests, and other vegetation. Ravages of harmful insects, therefore, must be fought principally through the creatures of whose menu insect-life forms a chief part. Thus the rats, mice, moles and shrews play an important part in this general plan of things. But these creatures, in turn, also must be controlled, lest they, too, become too great a menace to crops and orchards—and so the balance of nature is regulated. It will be noted, however, that the creatures which are preyed upon most have the highest reproduction ratio. Thus the insects which form a food supply not only for mammals but for bird-life and fish, are very abundant and multiply rapidly. Next, the mice, moles, shrews, etc., also are plentiful and raise large families. As we go up the scale, we find as a rule, the larger creatures rearing fewer young.

Last but not least, we have the relationship of animal-life to forest values. While birds perhaps are more of an asset to our forests because of the countless numbers of harmful insects they destroy each year, the mammal-life, or some forms of it at least, comes in for a generous share of commendation. The rodents, particularly, are constantly aiding in reforestation. Squirrels and chipmunks carry off and bury for future use a larger number of nuts. Usually these nuts are buried singly and thus the animals' little treasure homes are scattered promiscuously over large areas. It is not logical to assume that all of these nuts are eaten. Many are left untouched and ultimately produce trees. In fact they are more likely to germinate if planted by the squirrels, since these little creatures select only the best nuts, leaving the worm-infested stock under the trees. The gray and fox squirrels may be considered the best foresters. The chipmunk is also a forester in a sense, as it has the promiscuous nut-burying habit of the gray squirrel as well as the cache-building characteristic of the red squirrel.

AESTHETIC VALUE

In the present age one would think that the aesthetic value of mammals has been displaced by their commercial value, and that their beauty is manifest only in so many fur coats or other wearing apparel. We find ourselves wondering how many raccoons are killed each year in order to produce the number of coats that are so characteristic of the gridiron season. And we wonder the same about other creatures which meet a similar fate. But at the same time are we broadminded enough to realize that in the present day Man's desire to "turn our wild creatures into so many dollars and cents" is curtailed by wise conservation laws, and that the number that is allotted to Man each year is regulated through proper seasons and bag limits? Consequently, none of our interesting and valuable animals will ever be sacrificed on the altar of personal gain.

Some persons value our wild creatures so much that they look upon hunting and trapping as horrible. They never wonder where the leather comes from to make their shoes, or the wool to make their garments. Some even condemn trapping and at the same time wear fur coats.

The killing of a certain proportion of all wild creatures, each year, whether to provide food, raiment, or sport is absolutely essential. Were Man not take this step, then most creatures would face a far

worse death, or perhaps extermination of a whole species. They would increase to such proportions as to result in degeneration, disease, and starvation. And beware of the latter, for when creatures of any kind are permitted to increase beyond their proportionate food supply trouble of one sort or another always occurs.

When we realize that a certain number of creatures of all kinds must be removed we no longer look upon hunting as cruel. Instead, we recognize it as an effective agency destined not only to perpetuate the wild life, but to furnish outdoor recreation to hundreds and thousands of persons each year. Do not think for a moment that the beauty and interesting characteristics of our mammals are lost to those who go afield with shotgun and rifle. They are not. These persons are perhaps more susceptible to the charm of wild creatures than any other group, and they experience a greater thrill upon seeing the flashing deer with "flag" erect, a bounding rabbit, or slinking fox, than the person who is observing these things for the first time.

I have often tried to determine the true relationship between certain groups of people and wild creatures, and in every case I have arrived at the same conclusion: that the real sportsman, though he kills some wild creatures annually, is far more of a nature-lover than most other persons. There is nothing false about him. Certainly he is not like the man who condemns hunting and trapping at the same time that he tries to see "how close" he can come to a rabbit which bounds across the road in front of his car.

The beauty and grace of the white-tailed deer is unsurpassed. And does it not inspire us with a more vivd understanding of what the out-of-doors means to us? What is more delightful or amusing to watch than the comic antics of the squirrels, or to see the little chipmunks or "grinnies" fill their cheek pouches with grain or nuts? And the wild cat? What a magnificent creature to behold in its native haunts! Beautiful, yet equally as fierce and cunning, comparatively speaking as the larger carnivara that roam the veldt of far away Africa!

Whether or not the aesthetic value of our mammals is manifest through certain of their characteristics—their timidness, or boldness, or ferocity, or through the beautiful color of their pelage, is of no consequence. The truth is they assist in directing our thoughts into channels of outdoor pleasure and recreation, as a means of rest from days of toil in office and in mill, and that is why we like to have them about us. Without them the world would certainly be a dull place to live in.

COLOR

Practically all mammals, and especially their young, are colored to coincide with their natural surroundings. Thus the fawn deer with its spotted coat blends admirably into the sunlight and shadows of its forest home. The brownish-gray of the woodchuck converts him into one of the numerous stones of the field in which he lives, and other creatures are made equally inconspicuous by their colors, according to the particular enviroment in which they exist. The diurnal creatures of the open fields are almost always of a solid coloration over their entire bodies, whereas those which haunt the brush patches, woodlands, or forests are usually of mixed coloration and often striped, as the little chipmunk. Some mammals alter their colors with the change of sea-

MAMMAL TRACKS

1. Deer (elk tracks are larger). 2. Bear. 3. Raccoon. 4. Cottontail Rabbit. (Hare tracks are larger). 5. Squirrel. 6. Mink. 7. Shrew. 8. Weasel. 9. Skunk. 10. Woodchuck. 11. Opossum. 12. Muskrat. 13. Beaver. 14. Red Squirrel. 15. Fox. 16. Chipmunk. 17. Deer Mouse. 18. Wild Cat. 19. Meadow Mouse. 20. Common Dog. 21. Brown Rat.

sons. This is true particularly of the northern forms, such as the varying hare and weasel. Varying hares and some weasels turn white during winter in our latitude.

A conspicuous color in some creatures often tends to make them easy prey to hunters—that is, at first glance. But after we have tried to follow the bobbing tail of the cottontail rabbit or white-tailed deer with the muzzle of shotgun or rifle, we find that they intend to impair the accuracy of the hunter's eye, by destroying the unity of the target.

Although the protective coloration of wild creatures is just as Nature intended it to be, we must not lose sight of the fact that food conditions have a decided bearing on the subject. Animals living under ideal food conditions are likely always to retain their normal color pelage. And we must also take into consideration weather conditions or any other factor that tends to retard the growth of food-bearing plants and shrubs that go to make up their normal diet. Disease is also responsible to a large degree, effecting an inconsistency of color.

Albinism is present to some degree in practically all of our mammals. In 1928, particularly, Pennsylvania's deer herd contained a great many albino animals. There seems to be less albinism prevalent among the predators than the game creatures. Of the hundreds of thousands of gray foxes which have been presented for bounty since 1915, only two have shown any indication of albinism. And of a like number of red foxes, few have shown any noticeable lack of color pigment.

HIBERNATION

There are many forms of hibernation as it applies to mammal life. For instance, many creatures "hole up" for the winter and are never seen until spring. Others come out occasionally to look over the world of snow and ice, to shiver a bit, and to snuggle back in their warm retreats. The birds go southward; insects become dormant. Man himself is more or less inclined to stay indoors.

The fact that the normal foods, both vegetable and animal, of certain mammals is scarce during the cold months is no doubt the chief reason for their hibernation. And some creatures do not possess the physiological properties which enable them to combat heavy snows in search of what little food may exist. That is why Nature has endowed creatures that live where there are severe winters and heavy snows with powers and faculties which increase their facilities for getting about in search of prey. Thus, the varying hare, with its broad feet and added long hairs between the toes, which gave the creature its nickname "snow-shoe rabbit," is capable of fast and expert locomotion during heavy snows.

In order to prepare for hibernation some mammals like the bear, ground hog and bat, must literally gorge themselves throughout the summer months so as to accumulate sufficient fat to nourish their bodies during their long winter sleep. These creatures relapse into a comatose state in which all of their activities and vital processes are reduced to a minimum. The mammals known as "The Seven Sleepers" in children's story books are familiar to all of us: the bear, the raccoon, woodchuck, jumping mouse, chipmunk, skunk and bat.* There are

* Some species of bats migrate.

other creatures like the red squirrel, flying squirrel, some mice, and the wood rat, which store up food for winter use. The beavers store their food under water, so that when their dams freeze over they are assured of a winter's supply.

Field mice have a heartbeat of about 250 to the minute—which keeps them warm in any weather.

An so throughout the days of Jack Frost many animals are comparatively inactive and seldom observed. And we wonder perhaps many times as we sit before the glowing embers, just how our mammal friends are faring, and whether they, too, are warm and snug in their various dens.

FACTS AND FALLACIES

One often hears about many things that wild creatures are supposed to do, but do not. These fallacies as a rule apply to the reptile kingdom. More ficticious stories have been told concerning the habits of snakes than any other wild creatures. With mammals, however, most things that are said about them are true. But we must not believe that the bear or wild cat makes a habit of attacking people when they meet them, for they do not. Only when cornered or wounded, or in defense of their young, will these mammals ever molest human beings. Both the Raccoon and Muskrat sometimes wash their food, after a fashion, before eating it. They do not *always* wash their food as is commonly supposed, because a large portion of it is secured far from water.

It is a common belief that porcupines throw their quills. This is another fallacy. The spines are not "shot-out" but adhere loosely to the skin of the creature, and when their barbed points come in contact with the flesh of other creatures the quills are easily pulled out. Thus there is nothing true about the story of the porcupine that rolled beneath the apple tree and walked off with a peck of apples impaled on its spines.

It is true that the opossum hangs by its prehensile tail and feigns death or 'plays possum' when frightened, and that the young hang from the mother's tail as she bends it over her back. Thus they are not likely to fall off when the parent is moving. Like the kangaroo of Australia, the opossum has an external pouch in which the young are carried until strong enough to get about by themselves.

Skunks do not wet their tails and then flick the vile smelling fluid off. They are equipped with two scent glands, one on either side of the tail and from these is ejected the "perfume."

All mammals can swim, many of them expertly: Some swim only when forced.

Deer and elk shed their antlers each year.

Black bears climb trees; grizzlies do not.

The White-tailed Deer has no gall bladder. It has no incisor teeth in the upper jaw. It does not bury its horns after they have been shed. Shed antlers are usually eaten by rodents.

It is true that the little wood rat loves to torment mankind by stealing objects of one sort or another about his cabins and lodges in the mountains. Often it takes knives, forks, spoons, slippers, tin cans, anything in fact, and hides them either in some other nook or cranny in the cabin, or about its nest.

The flying squirrel does not fly, but it does glide or volplane, which is made possible by the loose strips of furry membrane which form both sides from ankle to wrist.

Squirrels do not conseiously use their tails as sails in swimming.

Bats are not carriers of disease parasites or bed bugs although sometimes insects which resemble the bed bug are found on their bodies.

The common house rat often spreads disease.

The bat does not try to tangle itself in people's hair, as is often supposed. This seldom happens and when it does is merely a result of its low flight. Bats are not blind, as is often intimated by the expression "blind as a bat."

Beavers do not, as many people suppose, eat fish, and therefore do not destroy the trout in their dams. Instead, their dams furnish excellent feeding grounds and hatching places for the fish. The entrance to the beaver house is under water; the nest, however, is above water level.

That beavers fell trees toward water probably is not true, save as trees happen to lean toward the water. Beavers do not suck air out of logs to make them sink.

Beavers do not use their tails as trowels or spades in erecting their house or dam. The tail is used prineipally as a rudder while swimming, as a prop while cutting down trees, or in slapping the water as a danger signal.

Gray foxes often climb trees when hard pressed by dogs.

It is true that the weasel and snowshoe rabbit shed their brown coats of summer for pure white ones in winter.

That the ground hog emerges from his winter's sleep on the second of February to see if the sun will cast his shadow is purely mythical. This myth implies that if the ground hog sees his shadow there will be six weeks more of cold weather, and if not, this day will be the beginning of warm weather.

The ways of Mother Nature are truly beyond our comprehension. Thus we often wonder just why the opossum, being a marsupial like the kangaroo, is in no manner shaped like his Australian cousin, and why the little jumping mice, which are in no way related to the kangaroo, look so much like him and have various of his characteristics.

It is often said by hunters and farmers that the rabbit population is reduced materially in a year because the ring-necked pheasant kills the young rabbits in their nest. The Game Commission has yet to receive one authentic report of this predatory instinct on the part of the ring-neck. The truth of the matter is that the ranks of "Brer Rabbit" are thinned out more by careless driving motorists than by any other agency. At many privately-owned pheasant farms, as well as at the State Game Farms, rabbits are very abundant. The damage to young rabbits mistakenly charged to the ring-neck is usually done by field mice or crows. Keepers at the latter farms, going about as they do day after day, have never once reported the killing of a rabbit by a pheasant.

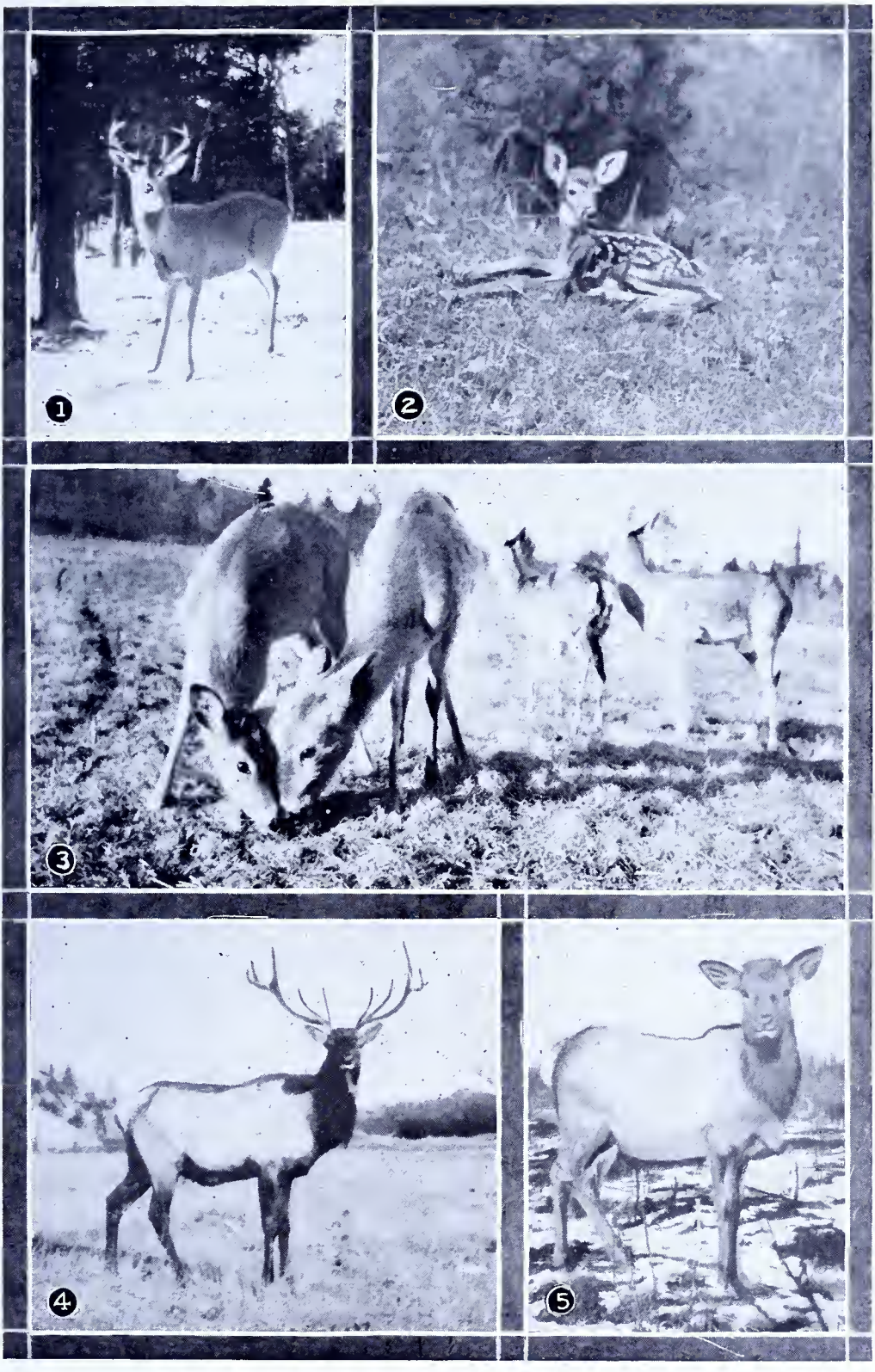

FIG. 1. A WHITE-TAIL BUCK ON THE ALERT. PHOTO BY GAME PROTECTOR ROLLIN HEFFELFINGER. FIG. 2. THE FAWN DEER IS PROTECTIVELY COLORED. PHOTO BY GEORGE M. SUTTON. FIG. 3. THESE YEAR-OLD DEER ARE "NOSEY." PHOTO BY SETH E. GORDON. FIG. 4. BULL ELK. PHOTO COURTESY OF U. S. BIOLOGICAL SURVEY. FIG. 5. COW ELK. PHOTO BY W. C. KELLY.

GENERAL DESCRIPTIONS

GAME MAMMALS

Game mammals are those which are valued chiefly as a source of food and recreation. Under the Game Laws of the Commonwealth they are referred to as "large game" and "small game" animals. The former includes the Wapiti (elk), Deer, and Bear; the latter, the Raccoon (also a fur-bearer), the Varying Hare, Cottontail Rabbit, Gray, Fox, and Red Squirrels.

While there is a hunting season permitted for these creatures, it will be remembered that it is of reasonable duration, consequently it is impossible to exterminate any of them by legitimate hunting, as wise laws govern the number which may be taken.

In Pennsylvania the hunting season* is confined chiefly to the months of November and December. Hunters must possess a license which costs $2.00 per year and permits them to both hunt and trap. Over 500,000 sportsmen take out such licenses annually. Non-residents also may hunt in Pennsylvania under a reciprocal license the cost being the same as that charged for a non-resident license by the state of which they are residents, except that it may never be less than $15.00. About four thousand of these visitors enjoy the chase in our fields and woodlands every year. Persons who live upon and cultivate lands within the Commonwealth are privileged to hunt on such lands, as well as on properties adjoining, with the owner's consent, of course, without a license.

WAPITI; AMERICAN ELK. *Cervus canadensis canadensis* (Erxleben).

Next to the Moose the Wapiti is the largest member of the deer family in America. The American Wapiti is commonly, though wrongly, called elk. The true elk is the European representative of our Moose; our Wapiti more closely resembles the European Stag. The males have large, widely branching antlers, maned neck, and short tail. There are comparatively few Wapiti present in the Commonwealth, although they have held their own since they were first stocked in 1913. In Pennsylvania the Wapiti is found only in a few sections, including Elk, Jefferson and Clearfield Counties, and possibly some parts of Wayne, Pike, Monroe and Carbon Counties. Males are termed *bulls;* females, *cows;* and young *calves.*

The sexes are slightly different in color. The head and neck of the males are dark sooty brown, the back and sides brownish-gray. The tail and rump patch are whitish, with a white patch between the hind legs. Underparts, blackish; legs, dark brown. The females are less strongly marked.

Bull elk are about 9 feet long and about 5 feet high at the shoulder. They may weigh from 700 to 1000 pounds. Cows are smaller, averaging about 7 feet long, 4½ feet high, and weigh from 500 to 600 pounds.

The young, which are born in May and June are of a yellowish-brown coloration, spotted with white. Usually there is only one, although there may be two, and rarely three. When born they weigh about 30 pounds. A cow elk usually bears young only about once in four years. The period of gestation is about 8½ months.

*See Pennsylvania Game Laws.

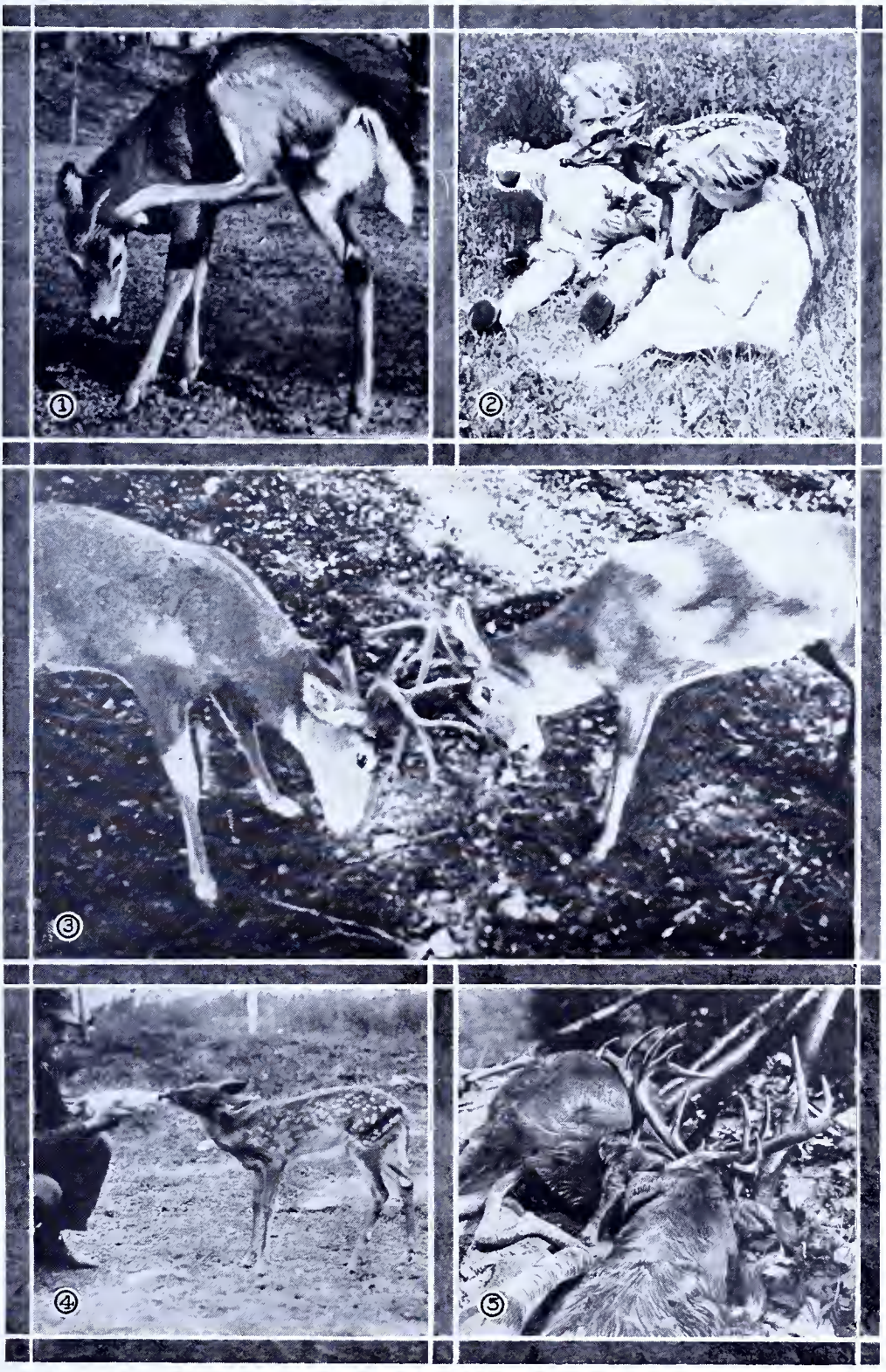

FIG. 1. TIME OUT FOR A SCRATCH. PHOTO BY SETH E. GORDON. FIG. 2. THREE INFANTS. PHOTO BY GAME PROTECTOR ROLLIN HEFFELFINGER. FIG. 3. BUCKS FIGHTING. FIG. 4. GRUB TIME. PHOTO BY FRED. A. GODCHARLES. FIG. 5. THE END OF THE FIGHT—LOCKED ANTLERS. PHOTO BY GEORGE H. CHAMPAIGN.

Elk feed upon various grasses, twigs, leaves and other vegetation, and are fond of salt. Like the deer, they shed their antlers each year. Their beautiful racks carry from 5 to 7 points, rarely more, which sometimes measure up to five and a half feet along the beam, following the curve. They have scent glands on their rear hocks. They have no gall bladder. The bulls render their "bugle call" challenge during the mating season which begins about October. The elk is the most polygamous of the deer family. During the mating season the males often battle. Sometimes their antlers become hopelessly interlocked and they starve to death as a result. Only about 10 or 12 elk are legally killed in Pennsylvania each year. Elk teeth are prized as symbols by members of the Order of Elks. Elk love to wallow in mud holes.

WHITE-TAILED DEER. *Odocoileus virginianus virginianus* (Broddaert).

America's best known large game mammal, and certainly one of the swiftest and most graceful. Abundant throughout practically every section of the state and present in practically every county. Even to glimpse a deer thirty or forty years ago was a rare experience; one that called for large headlines in the newspapers. Today the animals can come into the larger towns and even jump through bank or store windows, and the incident merely receives mention. They prefer second growth vegetation with reasonable amount of open territory; dense forest growths kill out their natural food supply. Males are termed *bucks;* females, *does;* and young, *fawns.*

The male grows a set of antlers (occasionally, though rarely, a doe grows antlers) which are shed each year during the winter (from late December until March). New antlers begin to appear soon after shedding and by late summer have attained their full size, although they are still in the "velvet" and rather soft. The "velvet" or thin covering of fine velvety-like skin is rubbed off on trees and brush about September at which time the antlers are well hardened. Growing antlers are very soft and any injury to them may result in permanent disfigurement. "Freak" antlers are usually formed in this way. The size of the antlers depends upon the stamina of the animal. The first set of antlers usually matures when the deer is about a year and a half old. At this time they contain no prongs and these deer are therefore referred to as "spike bucks." The next set of antlers usually forms a "Y" or two-point as they are commonly called by the hunters. Additional points may be added each year. The eye-sight is comparatively poor but the sense of smell and hearing is very acute.

The number of points to the antlers is a notoriously unreliable indication in judging the age of a deer, and the only real evidence is the teeth. A fawn is born with eight incisors (front teeth) on the lower jaw, and no molars or premolars ("jaw-teeth") on either jaw,—and no incisors ever develop on the upper jaw. Soon after the fawn is a year old the two middle incisors are replaced with permanent teeth, and thereafter one on each side of these two is changed to a permanent tooth each spring or summer. Consequently, a deer with all his incisors permanent is past four years old,—whether he has two points or twenty. Born without back teeth (molars and premolars) at all, the fawn develops these by early fall; but whether these change as do the incisors is not so well determined.

Fig. 1. Arms Full. Photo by Game Protector S. M. Shuler. Fig. 2. A "treed" raccoon. Photo by W. C. Kelly. Fig. 3. The Clowns of the woods. Photo by Deck Lane. Fig. 4. Releasing a black bear. Photo by Ralph McCook. Fig. 5. Bruin himself. Photo by Refuge Keeper Elmer H. Nelson.

The sexes are alike in color. In summer the upper parts are reddish-brown with the belly, throat and inside of legs whitish. A band across the nose, a small area around the eye and inside the ear, and the tail, are also whitish. In winter the reddish-brown upper parts become grayish or gray-brown and the hair becomes longer and thicker.

An adult white-tailed buck averages from 5 to 6 feet in length and is about 3 feet high at the shoulders. Does are smaller. The average buck under normal conditions should weigh from 100 to 200 pounds, although they often exceed 200 pounds.

Fawns, usually two and rarely three in number are normally born in May or June. They are also reddish-brown covered with numerous white spots which gradually diappear as winter approaches. The skulls of baby deer of both sexes are similar, but as the baby buck grows, the top of the skull develops two projections known as *pedicels,* which serve as the base for the antlers. As the skull becomes larger and thicker the pedicels which have spread out during growth do not noticeably protrude above the surrounding bone surface. Fawns weigh from 3 to 4 pounds each when born. They do not follow their mothers for the first few weeks. The gestation period is about 7 months.

Deer both browse and graze. They like the buds, leaves and tender twigs of trees and shrubs, grasses and various aquatic plants. They also eat acorns and are very fond of salt, and consequently are often observed about natural or artificial "salt liks." Like cattle, deer have no incisor teeth in the upper jaw. They are polygamous, and during the rutting season the bucks are very combative. In their fights at this period they sometimes interlock their antlers and eventually die of starvation as a result. Game officials and others have found many racks of shed antlers, some apparently gnawed by rodents. During the mating season the necks of the males are very much enlarged. When fighting they use both antlers and forefeet with which they strike with amazing rapidity. Their normal lifetime is about ten to fifteen years. Deer when running can attain a speed of about thirty miles an hour. They can clear an eight-foot fence with ease and have been known to make a running jump of over forty feet. Does and fawns render a bleating call when frightened. Bucks and does often snort when startled, the former sometimes also rendering a whistling sound. In winter when deep snows occur deer congregate in herds in thickly covered areas, often in laurel thickets, where they are well sheltered. These areas are called "yarding grounds." Deer also have scent glands on the hind shanks. They have no gall bladder. The wild cat is probably their only natural predatory enemy, occasionally capturing a fawn. Jesse Hassinger, State Trapper, has observed deer killing snakes by jumping on them with all four feet.

NORTHERN WHITE-TAILED DEER *Odocoileus virginianus borealis* (Miller).

This form or a desirable cross with *virginianus* is certainly present, as records show that several hundred were purchased and released between 1906 and 1925. The first lot of fifty were secured in Michigan in 1906. Subsequently additional small lots were purchased in Michigan, and from the Green Mountain Forest Association of New Hampshire. These deer are larger than the Virginia white-tail. Specimens observed at the hunting camps from time to time, partieu-

larly in the northern tier counties, judging from their size, coloration, etc., are most certainly either the true Northern White-tail or a cross of that with the Virginia White-tail. Rhoads, Mammals of Pennsylvania, Page 26, reports *borealis* as native of Pennsylvania.

BLACK BEAR. *Euarctos americanus americanus* (Pallas).

There is not much that need be said about the Black Bear. These "clowns of the woods" as they are often called, are perhaps more common in Pennsylvania than anywhere else in the United States.

Black bears are usually a glossy black, varying to a cinnamon brown in some individuals. The nose is yellowish brown. Sometimes a white patch is present on the chest. The hair is long, and while it appears coarse and shaggy at a distance, is moderately soft. The eyes are small and the sight unusually poor, except at very close range. Their sense of smell and hearing is acute, however. The claws of the fore feet are slightly longer than those of the hind feet, and the soles of all feet are bare. The bear walks on its whole foot, not only on the balls of the feet as most animals do.

The average length is about 5 feet although many animals over 6 feet have been taken in Pennsylvania. Adults average about 250 to 300 pounds, although weight, too, varies in individuals, and there are several authentic records of bears over 500 pounds being killed.

The young, which are called *cubs*, are born during the mother's winter sleep. Usually they are two in number. At birth they weigh just a little less than a pound, and are blind and nearly naked. The eyes open in about a month. The gestation period, according to some authorities, is about 7½ months.* The mating season for the Black Bear in Pennsylvania is probably about July or August, as foetuses taken from bears killed in two different sections of the State on the same date (Dec. 10, 1930) were of a size to indicate that the mother had been pregnant from five to six months. They are supposed to rear young only every other year.

Harry VanCleve, veteran bear trapper of the Commission cites three specific instances where he has known hibernating females to drive out yearling cubs just preparatory to bearing a new litter.

Black Bears are omnivorous and are fond of nuts, fruit, honey, berries, roots and grasses, ants, small birds and mammals and any rodents they may catch; they also eat fish, frogs, eggs, carrion, etc. They are adept at catching fish. The Black Bear is one of the "Seven Sleepers" or hibernating animals, and relapses into a comatose state in a cave, in or under an old tree stump, or in some suitable depression in the ground during the winter months. Black Bears climb trees easily, and like to roll about in muddy places. Sometimes these muddy areas are referred to as "bear wallows," and they become a regular rendezvous for many of the creatures when the weather is hot and sultry. Trees found noticeably marked with the teeth and claws of bears at certain heights, have been called "measuring trees." They are supposed to have been chewed and clawed as the creatures scratched their backs, which they can easily do on account of their ability to stand on their hind legs. Bears like to frequent clumps of beech trees and are very fond of the nuts. They often range widely in search of food.

*Seton: "Lives of Game Animals."

Bears were first protected in the United States by Pennsylvania in 1905 Cubs were protected in 1925. Sometimes bears destroy sheep, eattle, and many bee-hives, although the eattle and sheep killing practice is confined usually to a few individuals whieh have formed the flesh-eating habit probably by at one time or another being foreed to kill these larger creatures when natural food was scarce. Their curiosity is so intense at times that they repeatedly tear down the metal signs plaeed along the game refuges.

On January 19, 1929, Game Refuge Keeper George H. Hunt found a live cub in a small depression in the ground. It weighed 1 lb., 12 oz., and the eyes were sealed. It was cared for by Mr. Hunt and his wife and readily took to the bottle. Its eyes began to open about two weeks later and were completely open on February 1st.

It is most unusual to observe a mother bear and her cubs in their winter den, but several representatives of the Game Commission have had this interesting experience, the writer being one of the fortunate ones. I believe it only appropriate, therefore to eite the two instances on reeord.

The first record, that of John J. Slautterback, former Secretary of the Game Commission, is as follows:

"We arrived at the den at 1:00 P. M. The sun was shining directly into the entrance and the bear's head and shoulders were in full view. I stopped within eight feet of the mouth of the den. At first she showed signs of fear, then anger, but later the expression of her faee and eyes took on a pleasant or friendly appearance. I remained in one position within eight feet of her head for nearly an hour, with a movie camera ready to photograph the cubs should they appear, or rather the mother permit them to leave her side. This she would not do, and just as soon as one would attempt to move from underneath her neck or breast, she would nose it back out of sight. However, as they were very active, the mother eould not keep them hidden, and while she was nosing one back from under her head, the other would come out over her forelegs.

"About 2:00 P. M. the two cubs had their luneheon, the mother not changing her position except by raising her body enough for the cubs to get at her teats. Sometimes they would be on their backs then on their bellies. The noise made by the cubs while suckling was similar to that of young pigs. The two cubs were a trifle larger than full grown guinea pigs, and apparently were born the early part of February or late January.

"The mother bear, a large one weighing approximately 300 pounds. had not been away from the den although tracks showed that she had walked about the entrance to it. In removing briars, brush, etc., from the front of the den, our hands were within three feet of her face several times. She did not appear to resent this intrusion. However, when a large brush was removed with more or less of a crashing noise, she rose to her feet and came halfway out of the den where she hesitated for about thirty seconds and then backed in again.

"At one time while I was standing about eight feet from the den the mother turned and faced her head about six feet from mine, and yawned as if to show me her teeth and the size of her jaws. However, her actions and the expressions of her eyes and face were very pleasant and agreeable."

The following record is of equal interest: "During latter February, 1931, Game Protector Hayes T. Englert of Coudersport reported that two trappers found a female and three cubs in an old pine stump in Stewardston Township, Potter County. Mr. Englert later visited the den in company with the trappers. He stated that the mother bear weighed between 175 and 200 pounds and was lying on her left side when he first saw her. Before he left, however, she raised her head, turned it sideways, then put it down between her fore feet, and apparently went to sleep. The stump was approximately five feet in diameter at the base, three at the top, and about four feet deep. The writer visited this den on March 10 with Messrs. John Ross, Grant Gustin, Chauncey Logue, Blair Davis, Riley Walizer, and Hayes Englert, and we found mother bruin in precisely the same position as previously reported by Mr. Englert. Before we left the den, she shifted her position to the right side, and had risen slightly on her fore feet.

"I took several motion pictures of the cubs climbing over her back, and apparently the presence of the camera about three feet from the mother's face caused her to raise her head upon several occasions and snap at me. She was not very ambitious, however, and it seemed as if the mere raising of her head caused her some effort. She was shivering a great deal while we were about the stump, but I attributed this more to fear or nervousness than anything else.

"The cubs weighed about four or five pounds, and they whined and whimpered from time to time. Their eyes were open and they were fairly active. Some of us reached in and stroked mother bruin but she paid not the slightest attention."

Probably the best motion pictures ever taken of a hibernating bear were secured by Robert T. Leiter, photographer for the Game Commission.

In this instance mother bear had holed up in a rather shallow depression under some up-turned tree roots and there, in her comatose state, brought forth one cub.

The den was situated only a few miles from Lock Haven, Clinton County. When located, it was the signal for a regular stampede on the part of local residents to view the creature. So many persons visited her that the Game Protector had to place a wire enclosure about the area and post it.

At some time or another a large mongrel dog had approached the bear too closely and promptly had its skull crushed. Mother Bruin had pulled the dog into the den beside her and it had to be raked out before suitable pictures could be taken. It was badly decomposed. The first time the photographer tried to get some scenes the odor from the dog proved more of a strain than the mother bear's repeated attempts to lunge at and strike him.

RACCOON. *Procyon lotor lotor* (Linnaeus).

The Raccoon, often called 'coon' for short and sometimes referred to as "the little brother of the bear," is very popular among sportsmen, and is the only mammal in Pennsylvania which is classified both as a game and fur-bearng animal, under law. It is common throughout the State.

It is a chunky creature having a broad face and long, banded,

bushy tail. The nose is long and rather pointed. The ears are large and upright. There are five toes on all feet, the soles of which are bare and flat so that their tracks resemble those of a little child. The front feet are used as hands, with which they search for crayfish and other tidbits found under the rocks. The hair is rather long and thick.

The sexes are colored alike. Raccoons are brownish-gray above, pale gray beneath. The cheek patches are black. The tail is grayish with six or seven black bands. A white band above the eyes and across the forehead is divided by a thin blackish line which runs along the ridge of the nose.

Raccoons attain a length of about 3 feet. The tail is about 10 inches. They may weigh from 12 to 25 pounds.

The young which are born in April or May, usually number from 4 to 6 to a litter, and in color are similar to their parents. Mating takes place about February and the period of gestation is about two months.

Raccoons eat crayfish, frogs, etc., as well as various small mammals, small birds, and their eggs, insects, nuts, grain, etc. They hibernate only in extremely cold latitudes, and thus may be observed the year round in certain sections of Pennsylvania. They hunt at night and frequent stream sides and margins of lakes as they search the low water and riffles for food. Home usually consists of a hollow tree* or log. Raccoons are excellent climbers, and they can come down a tree either backwards or forwards. They sometimes wash their food before eating it. They are prized for their fur and many persons relish them as food, particularly the colored folk. Raccoons are exceptionally inquisitive creatures and make splendid pets. They also are tenacious fighters and often hold a group of dogs at bay. They have intelligent faces. Like the bear they are adept in catching trout and other fish, and when our streams are low they sometimes diminish the finny tribe materially. Raccoons, in turn, are sometimes preyed upon by wild cats and foxes.

During November, 1928, Mr. William Sill of Coatesville shot an albino raccoon. It weighed about fifteen pounds was was a perfect specimen. It had red eyes and the hair was white.

Humorous incidents often occur when the raccoon's curiosity gets the best of him. Dr. Geo. M. Sutton, former head of the Bureau of Research & Information of the Game Commission, states that one July evening at the State College Nature Study Camp in Huntingdon County, several noises were heard near the kitchen at about three o'clock in the morning, and one of the instructors went forth to investigate. He discovered that the sounds were coming from two large garbage cans which stood about forty feet from the mess hall. With flashlight directed into a pail-full of cabbage leaves and other material he made out the quizzical faces of four half-grown 'coons,' all of them standing up to their bellies in juices and crunching nosily at the special delicacies they were searching out. The instructor put a bushel basket over the can and the following morning went out to find three of the animals rather wet, but cross. One of them apparently had escaped.

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*On January 10, 1931, Watson B. McClarin, Game Protector at Salladasburg, Pa., found a family of three 'coons' occupying the upper cavity of a dead tree while the lower portion was in possession of a large swarm of bees. About fifty thousand raccoons are taken in Pennsylvania each year.

COTTONTAIL RABBIT. *Sylvilagus floridanus mearnsi Allen, and Sylvilagus transitionalis* (Bangs).

The rabbit is the best known of all our mammals. To the children, particularly, it is significant of the Easter Season, and the "Easter Bunny." It is smaller than the Varying Hare and its hind legs are not quite as long nor its feet as large.

It is brownish-gray above, and white, except the buffy area of the neck, below. The tail is brownish above, and white beneath, from which the creature derives its name. The course of the rabbit when scurrying away can be discerned for some distance by the bobbing white tail. The cottontail is about 15 inches long and weighs on an average of three pounds.

Several litters of from three to six young are born annually in spring and early summer as a rule, although young rabbits have been found in early fall. Their home is either a depression in the ground or underground burrow, the nest being lined with leaves, grasses and hair from the mother's body. The gestation period is about one month.

Rabbits feed chiefly at dusk, when many are seen along the roadsides. They like grasses, foliage, bark, etc., and often ravage the vegetable patch. Probably as many rabbits are killed each year in Pennsylvania by automobiles as by hunters. Also, a great many trappers deplete the rabbit population when they set their traps in holes of other creatures in which rabbits often seek safety or rest.

There are three species of rabbit in Pennsylvania. Sylvilagus transitionalis is found to the east of the Alleghenies. Sylvilagus floridanus mearnsi occurs west of the mountains. Sylvilagus floridus mallurus is common to the Carolinian and lower Transition Zones in southeastern Pennsylvania. The yellowish brown coloration of the first mentioned species is strongly mixed with black, and a distinct black spot appears between the ears. The other two forms are noticeably paler and lack the black area between the ears.

Rabbits are sometimes a nuisance to farmers and orchardists by eating various vegetables and destroying nursery stock. If farmers or orchardists permit hunting on their property they are not, as a rule, bothered by too many rabbits. Those that post their lands against hunting are often troubled considerably, however. The rabbits' chief enemies are some species of hawks and owls, weasels, foxes and wildcats. They thump their hind legs on the ground as a danger signal, and when frightened can run very fast. The writer observed an airplane alight in a field in Adams County on October 16, 1927. When the plane landed and coursed on its way for a few seconds, it frightened a rabbit which kept in advance of the plane for at least fifty yards. I would estimate the speed of the plane at about 30 to 35 miles an hour at the time.

VARYING HARE. *Lepus americanus virginianus* (Harlan).

The Varying Hare or Snowshoe Rabbit is larger than the Cottontail and has larger and broader feet, with long hairs. Were it not for this snow-shoe-like equipment they could not possibly survive the great snows of their northern home.

In winter they are white; in summer, grayish-brown above, whitish along the belly. The variation of color with the change of seasons is not a change of color of the hairs, but a new moult or growth of pelage,

The young usually number from three to seven. The nest is merely a slight depression in a sheltered place on the ground and is lined with grasses, leaves, and hairs from the female's body. The gestation period is about one month.

As a rule Snowshoes are found chiefly in the northern counties, although during extremely cold winters they have been observed farther south.

Inasmuch as Snowshoes are creatures of northern latitudes where ice and snow are present most of the time, Nature has endowed them with the means of changing color in order that they may better protect themselves from their enemies. Hares are chiefly nocturnal. They, too, thump the ground with their hind legs as a danger signal. Snowshoes rabbits are exceedingly strong swimmers. Their enemies include owls, foxes, wild cats and weasels.

While riding in an automobile in the region of Cooksburg, Clarion County, on June 17, 1927, I observed a snowshoe rabbit bound across the road not more than fifty feet ahead of the car. Almost at the same moment a large house cat sprang upon the creature, and by the time I had the door of the car open and was upon the scene of the "murder" the hare was breathing its last. Its throat had been cut. It was a beautiful specimen. An individual killed by an unknown hunter on December 15, 1928, was brown in front and white behind.

SQUIRRELS

The squirrels, comprising the Gray, Fox, and Red species have virtually the same characteristics. They are known by everybody and their chattering and scolding are familiar sounds of the woodlands. Their nests are either a cavity in a tree or a platform of leaves and twigs built upon a limb. Their food consists of nuts, seeds, berries, grains, fruits, and occasionally young birds and their eggs. This latter choice is more characteristic of the Red Squirrel than the other forms, however. And, the Red Squirrel, unlike its larger relatives, makes one or two caches or treasure-houses for storing its winter food. The Gray and Fox Squirrels usually bury individual nuts over large areas.

GRAY SQUIRREL. *Sciurus carolinensis carolinensis* Gmelin, and *Sciurus Carolinensis leucotis* (Gapper).

The Gray Squirrel needs no description. His long, flat, bushy tail gives him away when in motion, and thus he is readily spied by the hunter. The large lustrous eyes are beautiful to look upon. The fore feet have four toes, the hind feet five toes, all clawed.

There are two subspecies of the gray squirrel in Pennsylvania *(Sciurus carolinensis carolinensis)* which is found in the southern part and *(Sciurus carolinensis leucotis)* which is found only in the northern part of the state. The former is rusty brown above, whitish below, and is about eighteen inches long. The latter is larger and grayer. Squirrels average about a pound and a half in weight. The Black Squirrel is a color phase of the Gray, occurring chiefly in the northern tier counties.

There are usually two litters of from three to five young, the first being born about March or April. The gestation period is about 28 days.

Fig. 1. Snowshoe Rabbit. Photo by Division Game Supervisor Frank A. Myers. Fig. 2. Young Cottontail Rabbits. Photo by Leo. A. Luttringer, Jr. Fig. 3. Gray Squirrel. Photo Courtesy U. S. Biological Survey. Fig. 4. Red Squibbels.

Squirrels are active all year round. Their nests are built on the branches of trees in warm weather. Squirrels follow their food supply and thus may be very abundant in certain sections one year and almost entirely lacking during another year. They are easily tamed and readily become accustomed to city parks and man-made nest boxes. The writer has often wondered how they can so easily find the nuts they have buried. When nuts and other food are scarce they take much corn from the fields and are quite a nuisance to farmers in this respect.

During March, 1931, Mr. Robert T. Leiter saw a Gray Squirrel eating the brains of a cat killed by an automobile along River Park, Harrisburg, Pa. On April 19, 1931, he observed another squirrel nibbling around the head of a dog killed by an automobile along the highway near Gettysburg.

FOX SQUIRREL. *Sciurus niger rufiventer* Geoffroy, and *Sciurus niger neglectus* Gray.

The Fox Squirrel is the largest of our squirrels. Although there are said to be two subspecies present in Pennsylvania, the form under consideration is undoubtedly most common of the two, judging from observations made of hunters' bags, at least. This form is grayish-brown above, blending into a more reddish brown at the belly and thence to a reddish yellow throughout the entire underparts. Continuous restocking by the Game Commission is no doubt responsible for a noticeable increase of this form during recent years.

The other form *(Sciurus niger neglectus)* is paler in color with whitish belly. It is practically exterminated.

Fox Squirrels are chiefly local creatures and do not migrate like the Grays. In Pennsylvania they are found chiefly in the western part. There are usually three young.

Numerous young Fox Squirrels (about fifty) were secured during the clearing off of the Pymatuning Dam area in Crawford County during the spring of 1932. They were fed with medicine droppers until able to care for themselves.

RED SQUIRREL. *Sciurus hudsonicus loquax* Bangs.

The Red Squirrel, often called Pine Squirrel, Piney, or Chickaree, is common to the evergreen forests, where they usually are found in the pines and hemlocks. They are reddish-brown above, grayish-white below, with a white ring around the eye. They are about twelve inches long. Red Squirrels are very active and assertive in manner, and when their domain is invaded by Man they will scold and chatter for minutes at a time. Their food is the same as the other squirrels, although they are far more destructive to birds and their eggs than the other forms. They are very curious and often I have "squeaked" them out of their hiding places by producing a squeaking sound made by kissing the back of my hand.

The young, numbering from four to six, are born in May or June. The gestation period is about six weeks.

There are several varieties of Red Squirrels present in the state but it is a matter of controversy just how many forms do occur.

Red Squirrels are diurnal in habit. The inner toe on the fore foot

FIG. 1. OPOSSUM AND YOUNG. PHOTO BY ROBERT T. LEITER. FIG. 2. MUSKRAT. PHOTO COURTESY OF U. S. BIOLOGICAL SURVEY. FIG. 3. SKUNK. FIG. 4. MINK. PHOTO BY COURTESY OF U. S. BIOLOGICAL SURVEY. FIG. 5. OTTER.

is very small. They are aggressive and often fight with their gray cousins.

Mr. Chas. Sherer of Springtown, Bucks County, shot a Red Squirrel on April 21, 1931, in the act of killing a very young rabbit. It had already bitten through the skull of the little animal and apparently was eating the brains.

FUR-BEARING MAMMALS

Our fur-bearing mammals are of much value, consequently thousands of trappers operate each year and derive splendid monetary returns therefrom. In the case of some of our fur-bearers there is a combined fur and food value, such as the Raccoon (both game and fur-bearing mammal) and Opossum. And, while speaking of the Opossum let us consider it first on the list.

OPOSSUM. *Didelphis virginina* Kerr.

The Opossum is the only marsupial mammal on the North American continent. Its nearest kin, the Kangaroo, lives in Australia. It has a long prehensile tail and rather large, naked ears. The head and nose are long and slender. The tail is used in climbing, and the opossum can hang head downward by it. The opossum resembles a large rat. Its fur is long. The fore feet have five toes, all nailed; the hind feet also have five toes, but the first is without nail. The soles of the feet are bare. Opossums are at home both on the ground and in the trees. They are common chiefly in the Austral and Transition Zones.

Adults are a blackish-gray or slaty color, the inner, whitish fur being guarded by long, coarse black and white outer hairs. Face, pale yellowish to whitish. Feet, dusky. The marsupial pouch of the mother is merely a fur-lined opening along the lower belly. An opossum averages about 2½ feet in length. The tail is about 12 inches.

The young number anywhere from 5 to 14 and sometimes even more. Authorities tell us that from the egg an opossum ready for birth develops in 12½ days. So small are the babies at birth that a litter of 18 may rest secure in a teaspoon. Such a whole litter weighs one-fifteenth of an ounce—270 opossums, living, breathing, digesting animals would weigh one ounce. They are less developed than mouse babies, which themselves, as everybody knows, are blind, helpless bits of pink flesh. They do not have their eyes open for the seven or eight weeks that they are in the pouch, attached to the teats.

The pouch of the female is a fold of skin stretched around 11 to 15 milk glands on the lower abdomen in a region corresponding to the cow's udder. The pouch may be closed by ring muscles much as a tobacco sack may be closed by pulling the string; in this way the tiny babies may be guarded against cold and other dangers. Shelter, warmth, and food the opossum babies find in this admirable contrivance of Nature designed for the care of her children that are born sooner and in most respects less developed than any other mammal babies in the world.

It was formerly supposed that the mother very skillfully and delicately caught the young in her lips and placed them in the pouch and on the nipples. That's the story one finds in many Nature books. The facts are that when the baby opossum is born it crawls into the

pouch by itself, and it is for this first journey that it has well developed front feet. At two months the young scamper about on the old one, holding on to the mother's rich fur. In another month they hunt food for themselves but still for some time like to have their mother about for protection.

The Opossum is omnivorous. It eats small birds and mammals, frogs, fish, birds' eggs, insects, fruit, and occasionally poultry. It is very shy. The opossum is much loved by southern darkies as a food delicacy. A slow stupid creature, although hardy and tenacious of life, this creature plays 'possum, or in other words, feigns death, when cornered by an enemy. It nests usually in hollow trees or in a burrow beneath an old stump. Over 100,000 are trapped in Pennsylvania each year. Its chief natural enemies are Great Horned Owls, wild cats, and foxes.

On December 1, 1927, State Forest Ranger Leo Fish, with headquarters at Wellsboro, Tioga County, received many complaints of the disappearance of bittersweet in that section. Local residents blamed the skunks for nipping it off. He selected an area in which there was considerable of the shrub, concealed himself and kept diligent watch, and was surprised to see opossums nip off the vines and carry them to their dens. Upon further investigation, he found in one den about a bushel of berries sheltered in the rocks. The nearest bittersweet vines were at least one-tenth of a mile from the den.

Since we have discussed the Raccoon under our list of Game Mammals, we will merely mention him in passing here, and go on to another "well loved" creature—the skunk!

SKUNK. *Memphitis nigra* (Peale and Beauvois).

The skunk or "polecat" as it is usually called is robust of body, having a large bushy tail. It has a comparatively small head and short legs, and is about the size of a house cat. It is common throughout the state. Two scent glands beneath and on either side of the tail form the creature's chief means of protection. From these glands is ejected the powerful fluid so disliked by men and most other animals. This fluid can be thrown from eight to ten feet. Four curved claws on both fore and hind feet are ideal for digging. The under pelage, which is very soft, is guarded by long, coarse outer hairs.

The skunk is black, usually with a prominent white stripe beginning at the forehead and coursing down the middle of the back to the tail, which is whitish. Some are altogether black except for the white spot on the nose. There is a fine white stripe along the ridge of the nose. A narrow area of blackish marks a dividing line of the white area on the back.

Adult skunks are from 20 to 24 inches long and weigh about *four* or *five* pounds.

The young, numbering from 4 to 18, are born about April. The gestation period is 9 weeks. The young weigh about *half an ounce* when born.

Skunks are chiefly nocturnal and feed upon insects, mice, small birds and their eggs, and occasionally poultry. As they are slow moving creatures and absolutely fearless, many are killed by automobiles. The den is usually in a burrow, hollow log, or stone pile. Dried leaves

form the nest. Skunks are common locally about small towns and boroughs, where they often live under outbuildings. A mother leading her procession of young in single file is an amusing sight. While it hibernates, it does not assume the comatose state of the bear. If the scent glands are removed, skunks make admirable house pets. Over 200,000 are trapped annually. They turn over many rocks in the fields while searching for beetles, and often dig out the nests of yellow-jackets. Their chief enemies are great-horned owls, foxes, and weasels.

On the morning of July 25, 1928, a mother and five young climed the six foot wire fence surrounding the ringneck pheasant pens at the Game Refuge in Tioga County and killed several pheasants. Mr. Hugh Baker, the refuge keeper, hearing the commotion in the pens, investigated, and also killed the skunks. Field officers have observed them digging out the nests of yellow-jackets. On August 6, 1927, former Game Protector William L. Iback of Lebanon County found a young albino under a chicken house in the town of Richland. It was pure white and had red eyes.

MINK. *Lutreola vison mink* (Peale and Beauvois).

The mink is a large replica of the weasel, having the same reptile-like body even to the triangular head, short ears, beady eyes, and long bushy tail. There are five toes on each foot. It is dark brown above, paler beneath. An adult male mink is about two feet long, but the females are much smaller.

It is generally distributed, although not very abundant. About ten to fifteen thousand are taken each year by trappers.

The young number from three to ten, born in latter April or early May. The gestation period is about one month.

It is semi-aquatic and adept at catching fish and in swimming and diving. It is very agile, and consequently of a highly nervous temperment. It can climb, although it seldom does so. Although a fur-bearer, it is also a decided predator with the "killer" instinct. It dens in holes of other mammals or in rock piles or hollow logs. Perhaps the Great Horned Owl is its worst enemy, although I have an authentic record of a rattlesnake swallowing a half-grown mink.

An albino Mink was caught in Jefferson County by Russell McCool, of Sigel, Pa., on February 1, 1932.

OTTER. *Lutra candensis canadensis* (Schreber).

The Otter is a weasel-like creature about three and a half feet in length with a long tapering tail. It has short legs, and all feet have five toes. Both fore and hind feet are webbed, although the hind feet are noticeably larger. The soles of the feet are hairy.

The otter is a rich glossy brown above, paler beneath. An adult specimen weight from 15 to 25 pounds. Otters are comparatively rare. I feel justified in recording them as rare, as during the past few years fur dealers' reports have contained few records of them.

Otters prefer the larger and deeper streams along which to build their homes. Therefore, is it not logical to assume that the pollution of these streams, and the subsequent killing of the fish life, is just as much responsible for the present scarcity of the otter as the trapper? About the fresh water lakes of northeastern Pennsylvania otters are still found, but certainly not in abundance.

The young, which number from one to four, are born in latter April and early May. The gestation period is about one month.

Their homes usually are under roots of trees along streams or in banks, where they live in colonies like the beaver. Otters eat fish, frogs, and crayfish, and at times some small rodents. Otters are considered the principal enemies of the beaver. This is probably because they live in the same environment and are of an almost like size. Mr. Harry Van Cleve, veteran trapper of the Game Commission, has on two occasions pulled dead otters from beaver dams. From the cuts and scratches on their bodies, they suffered cruelly at the hands of the beavers. They are expert swimmers and divers. Food is held between the fore feet when eating. Otters are active both day and night. They do not hibernate in Pennsylvania.

We have few records of the otter. The latest record (December 15, 1930) came in the form of a request for the Game Commission to remove a family of six in the region of Canadensis. Before the Commission could act, however, a private trapper secured all of the animals. On June 12, 1930, Game Protector George H. Watrous found two otters living in the same pond with a beaver colony. The place is known as Page's Pond, Susquehanna County. Several otters are also living in Porters Lake, Pike County.

MUSKRAT. *Ondatra zibethica zibethica* (Linnaeus).

The Muskrat is by far the most common, and perhaps in the aggregate the most valuable of our fur-bearers, and the "prize" of all the younger trappers. This large rat is familiar to almost every one, and its burrows in the banks along our streams, or their houses in our swamps, rivers, ponds, and lakes are eagerly looked for. The hind feet of the muskrat are partly webbed, and its long tail, scaly and sparsely haired, which is flat on the sides, is used as a rudder in swimming just as the tail of the beaver. The front feet have four toes and the hind feet, five. The fur is waterproof and the soft under pelage is guarded with longer, coarser hairs. The brown upperparts of the muskrat vary in shades in individuals. They are paler below. The tail is black and the feet, dark brown. Muskrats are about 21 inches long and weight about 2 pounds.

Several litters of from 4 to 9 young are reared from early spring until fall of each year, although they may range anywhere from 4 to 14 and are naked and helpless when born. The gestation period is *not definitely* known although it must be somewhere between three and four weeks.

The Muskrat eats aquatic plants, crayfish, mussels, and sometimes fish. It is active day and night, although chiefly nocturnal. When the muskrat builds in a bank the nest occupies a large compartment at the end of the tunnel. Its houses in streams are beaver-like, the nest-chamber being above water level, but the entrance usually under water. These houses are conical in shape and are several feet high. They are made of sticks, roots, grasses, etc. The muskrat does not hibernate, although it stores up winter food. It is an expert swimmer and diver and is seldom observed away from water. When plucked and dyed by the furrier, the skin of the muskrat is known as "Hudson Seal." There is a musky odor given off by the pair of perineal glands, from which the animal derived its name.

During a flood period at Corry, Erie County, on July 19, 1928, Game Protector C. W. Clark found numerous litters. The creatures ranged in size from a mouse to half-grown. The mothers had made "cute little nests" on logs and among the debris. The litters ranged from 5 to 9.

Mr. Harry Van Cleve once found a pair of muskrats that had taken possession of a deserted beaver house. He opened the house and found where the little animals had stored over a bushel of the terminal twigs of the willow. When he saw this little food-store, he promptly repaired the beaver house.

PREDATORY MAMMALS

Although there are many mammals which can be classed as predators, the four which are considered the most destructive in Pennsylvania are the Wild Cat, Gray and Red Fox, and Weasel. Incidentally, the latter three species are also extremely valuable for their fur, which is an added incentive towards their capture.

WILD CAT. *Lynx fufus rufus* (Schreber).

In appearance the wild cat, bob-cat, or bay lynx resembles an overgrown house east; in fact so much so that often unusually large and spotted house cats have been sent to the offices of the Game Commission for bounty. Usually such specimens are submitted in ignorance, although sometimes it is a direct attempt to defraud, and in these instances the tails have been cut short to conform to that of the lynx. None of these claims have ever passed the experts of the Commission, however. The ears are only slightly, if at all, tufted. The legs are long, and the feet broad, with five toes on each foot.

The bob-cat is yellowish brown above, heavily spotted with dark brown on the sides, and whitish beneath, also spotted. The ruff of hair on either side of the head is streaked with dark brown. Several brownish rings are prominent on the upper part and halfway round the tail, which is also tipped with dark brown. The under part of the tail is whitish. The ears are tipped with black.

The wild cat is about three feet long, and may weigh from 15 to 40 pounds. They are found chiefly in the mountainous sections in the northern part of the state.

Usually from three to five are born, in April or May. The nest is either a hollow log or cave.* The gestation period is about 55 or 56 days.

The menu of the bob-cat consists chiefly of game birds, and mammals, and especially rabbits, squirrels, and grouse. It eats many rats and mice, and occasionally deer. From 200 to 400 are taken in Pennsylvania annually. A coward as a rule, the wild cat will battle when cornered or in defense of young. It will swim if forced to water. It is agile and cunning, and will crouch on a limb or in bushes, from which it springs upon unsuspecting prey. The wild cat is chiefly active at night, although it occasionally wanders about at day, especially at dusk.

*Several years ago, a wild cat den was found by officials of the Game Commission, who placed a trap at the entrance. After seven days and nights the cat was forced to come out, and was caught alive and kept for educational purposes.

FIG. 1. WILD CAT. PHOTO BY ARTHUR G. LOGUE. FIG. 2. GRAY FOX KILLING RABBIT. FIG. 3. COMMON WEASEL. PHOTO BY NORMAN MCCLINTOCK.

A cat killed on November 9, 1928, weighed 24½ pounds and measured 37 inches from tip to tip. A cat held in captivity in the Williamsport Zoo weighed 39 pounds.

On November 19, 1927, Mr. Samuel L. Dietrich shot a cat from a tree near Lykens, Dauphin County. He waited for sometime to make sure it was dead, but upon stooping to pick it up, the cat sprung at him and in the tussle got both Dietrich's hands in its mouth. He called for help and then fainted, but was rescued by a fellow hunter who clubbed the animal to death.

On November 27, 1927, a party of five hunters hearing peculiar noises in a nearby swamp investigated and found a female cat with five kittens.

The finest specimens of wild cats ever observed by the writer were trapped on Upper Jerry Run, Cameron County on December 9, 1930. by Ernest Bray—a mother and three half-grown young. They were brought to the Game Commission offices alive, for display purposes. A bounty of $15.00 is paid on the wild cat.

RED FOX. *Vulpes fulva fulva* (Desmarest).

Dog-like in appearance, but gifted with a far greater cunning, the fox is only too well known both by farmer and sportsman. Its slender body is built for speed, and its long-pointed nose is highly sensitive of smell. The tail is long and bushy. The ears are upright and pointed. There are five toes on the fore feet and four on the hind feet. The claws, which are long and sharp, cannot be drawn in like those of a cat. The fox walks on its toes, or rather the balls of its feet. Foxes have keen vision and hearing.

The Red Fox is reddish-yellow above, white below. The feet are blackish. The tail is yellowish mixed with black, and has a white tip. The nose which is bare, is blackish at the base, and the back of the ears are also black.

Red Foxes are slightly over three feet in length and weigh about 10 pounds.

From five to ten young are born in March and April. The male assists the female in household duties and brings food to her until after the young are born. Young foxes are often called "kits" or "pups." The gestation period is 51 days.

The fox feeds upon small game birds and mammals, poultry, mice and other rodents, fruits and berries, fish, carrion, and snakes. It has a yapping cry or bark. The Red Fox does not as a rule climb trees. The Legislature of 1929 removed the bounty on the Red Fox realizing that its fur value alone would be sufficient incentive to regulate its control. Between 8,000 and 9,000 Red Foxes are taken each year. Foxes are night prowlers and forage far from their home dens. They usually dig their own burrows, either in the ground or under hollow stumps. The Red Fox has a northerly distribution and occurs chiefly in the northern and mountainous counties of the state.

A few interesting records are as follows. On March 1, 1928, Mr. H. L. Montgomery of Marianna, Washington County, took a mother and eight very small pups from a den not far from town. The young foxes' eyes had opened; their fur was principally dark brown, with lighter hairs intermixed. Their faces were marked in the region of the eyes with a lighter brown area. The tips of the tails were white.

On March 9, 1929, Miss Ivy M. McKinney of Sheffield, Warren County, captured a female Red Fox containing six unborn young which were forwarded to the Game Commission. These young would probably have been born within the next few days. They were dull gray in color, with plainly white-tipped tail, and a somewhat buffy area above the eyes. The claws were fully formed though the eyes were closed. Weights and measurements of the six specimens follows:

1. Male. Weight: 2¾ oz. Length over all: 185 mm. tail: 56 mm. hind foot: 26.5 mm.
2. Male. Weight: 2⅔ oz. Length, over all: 200 mm. tail. 63 mm.; hind foot: 25.75 mm.
3. Male. Weight: 2⅔oz. Length, over all: 185 mm.; tail: 64.5 mm.; hind foot: 26 mm.
4. Male. Weight. 2¾ oz. Length, over all: 196.75 mm.; tail: 63.75 mm.; hind foot: 27.75 mm.
5. Female. Weight: 2½ oz. Length, over all: 183.5 mm.; tail: 58.25 mm.; hind foot: 25.5 mm.
6. Female. Weight: 2½ oz. Length, over all: 185 mm.; tail: 62 mm.; hind foot: 24.5 mm.

The following is an interesting report of Forest Ranger W. J. Buck, Big Springs Camp, Moshannon State Forest, Clearfield County, as relayed to the Game Commission by Game Protector William J. Delansky on July 8, 1927:

"During the past several years a Red Fox has reared pups near my camp in the Moshannon State Forest. I have tried to trap this shy old female during the pelt time but for some reason failed to do so. Each year she would change her den—sometimes it would be in the Deer Creek section, then again on the Gifford Run Section. This year I did not locate her until the fur season was over. This time she was rearing her pups in a quarry of stone along the Caledonia Pike on the Upper Deer Creek watershed. Along in early March, I saw her several times while returning to my camp via the pike. Sometimes she would be carrying a groundhog, and at other times a rabbit. I had to wait until a light snow came before I could track her to the den. At last the snow came and while on my way to camp one day I saw her coming up the pike with another groundhog. As soon as she saw me she stepped off the pike and went around me and back on the pike again. After she was out of sight I took up the trail and followed it to the den. Feeling satisfied she was located there, and wanting to see her pups, I remained about that section for several hours, noting the bones and fur lying about almost everywhere. The next evening I came back and again remained for an hour; again she came, bringing in a rabbit. For several weeks I watched her, trying to see the pups, but without success. So again in May I visited her den, to find that she had brought in a young fawn deer. The small legs and the head were still lying upon the ground near the den. Being surprised at this, I again kept watch and the following day she brought in another fawn and had eaten off the flesh, leaving its feet and skull upon the ground near the entrance. I then thought it best to try and kill her and the pups. However, it was some weeks later before I had a chance to do this, and when I went back I found that the whole family had quit the den."

Subsequent report offered by Mr. Delansky: "I was at Mr. Buck's camp during the latter part of June and after hearing his story, I wanted to see this den to make some observations. Mr. Buck gladly took me to this den which was under a huge rock in a thick cover of young spruce and vines. Near the opening we found 14 skulls of groundhogs, several rabbits and grouse, the remains of the two young fawns, while several feet inside the den we hooked out two large deer heads, which I suppose were from animals she had found dead and cut off their heads and brought same to the den. The one was a year old doe and the other a spikebuck with 3½ and 2" spikes. We did not pick up all skulls and bones, for they were scattered about for several hundred yards around the den."

GRAY FOX. *Urocyon cinereoargenteus cinereoargenteus* (Schreber).

The Gray or "Tree Fox" is smaller, less keen, and lacks the speed and endurance of the Red Fox. It is chiefly southern in distribution.

The upperparts are sooty gray mixed with black, being darker along the middle of the back and upperpart of the tail, which is tipped with black. The sides and underparts of the tail are a mixture of gray blending into reddish-brown. A reddish-brown band beginning about the ears forms a bib beneath the throat. The inside of this bib is white. The outer sides of the legs are reddish-brown. A noticeable area of reddish-brown also marks the division between the gray upperparts and the buffy brown underparts. The inside of the ears is white.

From three to five young are born in March or April. The gestation period is from 50 to 60 days.

Gray Foxes are about three feet long and weigh about 8 pounds. While generally distributed, they are found chiefly in the southern counties.

Their food is the same as that of the Red Fox. Gray Foxes are easily "treed" by dogs, therefore they are not considered as desirable a trophy as the Red Fox. The Gray Fox can climb easily, although it seldom does so unless forced. Trees that it climbs are usually leaning ones or those whose limbs grow near the ground, such as the hemlock, although they have been known to climb the trunk of a perpendicular tree that is bare of limbs. Dens are built in hollow trees or fissures in rocks. Because its hair is coarser, it is not nearly so valuable a fur-bearer as the Red Fox. It is said to be able to jump from 9 to 10 feet from the ground. About 9,000 are probated for bounty each year, the price on their heads being $4.00.

Of the hundreds of thousands of gray foxes that have been presented for bounty since 1915, only two have shown any indication of albinism. One of these was sent in by Carl Eicher, Latrobe, Westmoreland County, on January 20, 1931. The other was caught on December 10, 1930, in Centre County. Both pelts are in exeellent condition and will be mounted for display purposes. Both skins, while not entirely white, are rather beautiful in their peculiar coloration, and they will form a valuable addition to the Commission's ever-growing collection of unusual specimens and "freaks." Of the hundreds of thousands of Red Foxes that have been received, very few have ever shown any trace of albinism, according to officers of the Bureau of Predatory Animals.

WEASELS

The Weasels, of which there are three forms present in Pennsylvania—Common, Least, and Bonaparte's—are very valuable for their fur, particularly the white pelage which is used so exclusively by furriers to make up the so-called ermine coats. Because of their fur value, therefore, in addition to the $1.00 bounty which is paid upon them, these blood-thirsty creatures are kept in check to a reasonable degree.

COMMON WEASEL: NEW YORK WEASEL. *Mustela noveboracensis noveboracensis* (Emmons).

The Stoat or Ermine as it is often called, is a long thin animal having a reptile-like body, beady eyes, and short legs and tail. All feet have 5 toes; the soles of the feet hairy; the ears are rounded. This weasel is generally distributed and is very common.

The summer coat of the weasel is yellowish-brown above and white beneath. The tail is tipped with black. In winter it is white with black-tipped tail. In Pennsylvania the change of color or moult apparently occurs only in the colder latitudes, as among the thousands of pelts which are received at the offices of the Game Commission each winter comparatively few are white. An adult male weasel is about sixteen inches long; the females are smaller.

From five to six young are born usually in latter April and May. The gestation period is about 42 days.

The weasel is the most promiscuous killer and the strongest and most agile of all our mammals for its size. It eats small mammals and birds, including many valuable game varieties; also poultry, mice and rats. As a rule the weasel sucks only the blood from its victims. It dens in holes of other animals, in rock piles or hollow logs. The fur of the weasel is very valuable especially when white. This value, together with the $1.00 reward paid upon its head has been sufficient to keep the animals under proper control. Bounty is paid on from sixty to eighty thousand weasels each year. The weasel very commonly kills more than it can eat. It is bold and curious and can be "squeaked" from its hiding place by kissing the back of the hand. The weasel has an exceptionally keen sense of smell, sight and hearing. It can climb trees if necessary, and often has been known to do this. The weasel emits a disagreeable odor when attacked. Its numerous teeth are very sharp.

The following record of observations made of a weasel held in captivity in the offices of the Game Commission is very interesting:

On May 28, 1927, Mr. E. H. Davis of York Springs, Adams County, caught two immature weasels alive, one of which died or was killed while enroute to Harrisburg. The living one was put into a cage and motion pictures were taken of it. He squeaked and chuckled in anger, considerably, and was a nervous and active subject difficult for the camera to catch properly.

He ate readily and consumed nearly all the English Sparrows which were presented to him. By degrees he became accustomed to human beings. A live sparrow was liberated in his cage on June 6. He sniffed the air repeatedly, and could not see the bird clearly it seemed. Nevertheless, he pursued it in an aimless fashion, until in a fortunate dash he succeeded in getting a mouthful of feathers. Thereafter he

was so excited and blood-thirsty that he followed his quarry rapidly and unerringly and finally pinned it to the screen in the upper part of the cage.

He chewed it savagely again and again, and as soon as it was dead he hunted about for more. The strength in his jaws was remarkable. Sparrows attached to strings were dropped into the cage. After the weasel took hold he refused to let go, even though he and the sparrow were lifted by the string into mid-air.

He dragged all his quarry through a small entrance hole into the pasteboard box where he stayed. The box is lined with feathers. Before beginning to eat he drags the bodies of sparrows securely into the box.

One of the men has the captive weasel at his home (June 27) and it got away from the cage and could not be found anywhere. Eventually a small, thin pile of straw was noted. Though it seemed scarcely possible that the weasel had taken refuge there, the straw was nevertheless examined, and the animal, with a heat system of runways through the straw, was found underneath!

The captive specimen is becoming tamer as it becomes accustomed to contact with human beings (July 11.) It captures and kill sparrows which are liberated in its cage, putting them out of commission with a single crunch or two of its jaws, which succeed in crushing the skulls, particularly of the young birds, very easily. The soft cooing note made by the animal as it moves about might also be called musical. This note is given particularly when the skin of another weasel is dragged in front of the animal. An instinct for play seems to assert itself often in this captive. It will run about chasing a piece of white paper or some object fastened to a string, will chew and claw clothing and attempts in a frolicsome manner to bite hands and fingers that are placed near it. It does not seem to be malicious, although it has drawn blood by one of its gentle bites. It is amazing that it can so easily run upside down on the roof of the cage by hanging to the woven wire. In entering its box it moves rapidly and the head and neck appear at the entrance of the box before the tail has disappeared. Its tail seems always to curl toward the left. I have not yet seen it either straight or curled to the right. He took a bath today, becoming fairly wet all over the underside of his body but remaining fairly dry on his back. He tried two or three times to run up our trouser legs, especially when a scratching noise was made which attracted him.

Today (July 13) it was discovered that when holding the captive weasel up by his tail he makes no attempt to turn around and bite one's hand.

He jumped quickly out of the cage this morning (Jan 3, 1928) and bit Harold Plasterer on the hand. He spends much time playing with paper towels which are put into the cage with him. It does not matter, apparently, whether the towels are flat or crumpled.

The weasel killed a rat today (January 4, 1928). His movements were very rapid. The rat did little more than kick and squeal.

The weasel killed four or five mice in about as many seconds (February 15, 1928).

LEAST WEASEL: ALLEGHENY WEASEL. *Mustela rixosa alleghaniensis* (Rhoads).

Because of its very small size—about seven inches—this weasel is well fitted to ravage the run-ways of the mice and other rodents upon which it feeds almost exclusively. In summer the least weasel is a warm-brown above, white below. It is white in winter. The young seem to be a darker brown.

The young, usually numbering from 5 to 6, are born in May.

Several specimens of half grown Least Weasels have been received in the offices of the Game Commission in late December, indicating a second litter.

We have many records of the least weasel chiefly from the western and southwestern part of the state, although they are supposed to be comparatively rare. It is widely distributed west of the Allegheny Mountains, although only a few records, have ever been definitely established in the eastern part of the state. Two are from Tioga County, one from Mifflin County and one from Dauphin County. The Least Weasel climbs readily.

BONAPARTE'S WEASEL. *Mustela cicognanii cicognanii* Bonaparte.

We have quite a few records for the Bonaparte's Weasel chiefly from the northern portion of the state, which would tend to show that this form is no doubt common to that latitude. They are about 10 inches long, a rich mahogany brown above, with white underparts. They change to white in winter. The tail is tipped with black. Practically all specimens of this form which have been received at the offices of the Game Commission have been in white pelage.

OTHER MAMMALS

WOODCHUCK. *Marmota monax monax* (Linnaeus).

The Woodchuck is often called Groundhog, Whistle Pig or Marmot. It is a chunky animal with a broad, short head, small eyes and ears, and a blunt nose. The legs are short. The four well-developed toes of the fore feet are well adapted to digging. The hind feet have five toes. Groundhogs have soft under fur with long, coarse outer guard hairs. In color they are gray, washed with brown above, paler below.

From three to eight young are born in April. The gestation period is about 42 days.

Woodchucks are vegetarian and eat various grasses, clover, garden crops, etc. They have exceptionally keen eyesight. The seldom range far from their burrows and are always alert and often observed sitting upright on their hind legs nibbling some favorite delicacy. Woodchucks are not communal, apparently, and as a rule but one is found in any burrow after a family breaks up. They are natives of pastures and sunny hillsides. "Whistle-pigs" render a whistling sound when cornered and chatter their teeth. Because they are so common and are favored as a food by many persons they are quite popular with sportsmen. They are not protected and may be hunted any time of the year. Woodchucks hibernate and assume the comatose state of the bear. Legend tells us that on the second of February the woodchuck emerges from his winter's sleep to see if the sun will cast his shadow. A pair of young groundhogs held in captivity in the offices of the

Game Commission for several days were very tame and would sit on their hind legs and eat one banana after another. They also like candy and apples. Groundhogs are not sociable usually and as a rule only one creature occupies a burrow. They have no fur value. They are active only in the daytime. A heap of ground marks the entrance to their home. Dogs, black bears, foxes, weasels, and some of the larger hawks prey upon woodchucks.

SOUTHEASTERN CHIPMUNK. *Tamias striatus striatus* (Linnaeus).

The Chipmunk is often called Ground Hackee, Grinnie, or Chipping Squirrel. This little striped ground squirrel is common everywhere. Often they startle hunters by the noise they make as they play here and there among the dried leaves of the forest floor. They are alert creatures, very agile, and often observed running along fence rails, or climbing about old stumps or fallen logs. They live in an underground burrow, usually in some rocky area. When frightened, "grinnies" render a shrill chirping whistle, and the nervous energy which accompanies their fear is manifest by the convulsive twitching of tail and body. They measure about 10 inches and are reddish-brown mixed with grayish over the middle of the back and head. There are five black and two white stripes along the back from the shoulders nearly to the tail. White areas above and below the eye extend back to the ear with a small black line both in front and back of the eye· cheeks yellowish white, underparts whitish. Tail rusty brown, lightest at base. There are five toes on the hind feet, and four toes on the fore feet.

The young number from four to five and are usually born in May or June. At birth, they are about the size of a lima bean and are blind, naked and helpless. The period of gestation is about one month.

Chipmunks eat seeds, nuts, grains, eggs and young of ground-nesting birds, mice and snakes. Their cheek pouches will hold a great deal of food material. Our files show one record of the cheek pouches of a dead "grinnie" holding 10 chestnuts, another 22 grains of corn and another 24 whole beechnuts and 26 kernels. We have other records of their cutting quinces. Chipmunks have the food-storing characteristics of both the Gray and Red Squirrel. They make several large caches, as well as burying individual nuts over the areas that form the home range. They are not protected in Pennsylvania. Hawks and owls, foxes, wild cats, and weasels are the enemies of chipmunks.

The northern form, *Tamias striatus lysteri* (Richardson) is no doubt present in the higher Alleghenies, but to what degree I am unable to say. This species is larger and noticeably paler than the former.

PORCUPINE. *Erethizon dorsantum* (Linnaeus).

Truly the robust, roly-poly appearance of the porcupine with its many quills resembles "milady's" pin-cushion. It is often called Hedgehog or Quill-pig. It has a comparatively small head, blunt nose, and rather short legs. There are four claws on the fore feet and five on the hind feet. The tail, which is short, very thick, and powerful, is used in defense, and the object with which it comes in contact is filled with many of the sharp spines. The porcupine does not "shoot" its quills as so many persons believe. Since the spines are barbed and

FIG. 1. WOODCHUCK OR GROUNDHOG. FIG. 2. YOUNG WOODCHUCKS. PHOTO BY ROBERT T. LEITER. FIG. 3. CHIPMUNKS. FIG. 4. FLYING SQUIRREL. PHOTO COURTESY OF U. S. BIOLOGICAL SURVEY. FIG. 5. PORCUPINE. PHOTO BY ROBERT T. LEITER.

loosely attached to the skin they are far more easily pulled loose from the porcupine than from his victim.

Porcupines are of a general blackish coloration sprinkled with whitish-tipped hairs. The spines are yellowish-white tipped with black. Porcupines are about three feet long and weigh from 15 to 40 lbs. They are common to the north woods and evergreen stands. Particularly is the Cooke Forest of Clarion County well populated with these creatures. They are not protected in Pennsylvania.

The young, usually only one, is born in May. The period of gestation is not known, although it is evidently rather long, as the unusual size of the young when born tends to show. (The Game Commission has several authentic records of Porcupines bearing two young.)

Porrcupines eat bark, buds, foliage, shrubs, and plants. They are clumsy and slow-moving, although excellent climbers and good swimmers. Quills of the porcupine work inwards, and since animals wounded by them cannot readily pull them out the barbs often find a vital spot and cause death. Porcupines are fond of salt and often invade hunters' camps and many times chew through the door or floor in an effort to find this delicacy. The are occasionally eaten for food. They have the bad habit of girdling trees. They are sometimes caught by eagles, owls, wild cats and black bear. In the north the Fisher is said to be their principal enemy.

The have been known to do eonsiderable damage to whitewashed telephone poles along State highways, the salt contents in the whitewash proving attractive to them.

Just outside Glen Union, Clinton County, is a little dilapidated red church on the left side of the road, which was used by the miners and their families when the town was booming. It is now called "Porcupine Sunday School," for these creatures have made it their rendezvous and hardly a portion of the floor remains. The "porkies" are slowly eating up the church.

BEAVER. *Castor canadensis canadensis* Kuhl.

As in many other parts of our country, the Beavers were once abundant in different sections of Pennsylvania, but they were so extensively trapped for their pelts that by 1850 they were virtually exterminated.

All that was left to tell the wonderful story of these famous animal-engineers thirty or forty years ago was such familiar and suggestive names as Beaver Dam, Beaver Creek, Beaver Meadows, Beaver County, and so forth, and occasionally someone, while wandering through the wildest portions of the mountains, found the remains of their ancient dwelling places about streams and dams.

There seem to be but a few records of any sort concerning the last known colony in the state, and these do not agree in the least. Mr. Abraham Neveling of Coalport, a well-informed naturalist of former years, once stated that "The last Beaver was trapped in Clearfield County in 1837." Another old record tells us that one George K. Boak, of Pine Glen, claimed the animals were to be found in Centre County in 1867; and still another ineludes a statement from a Mr. Seth Nelson, of Clinton County, which goes on to say that the last Beaver was killed on Pine Creek in 1884.

An annual report of the Game Commission for the year 1902 by

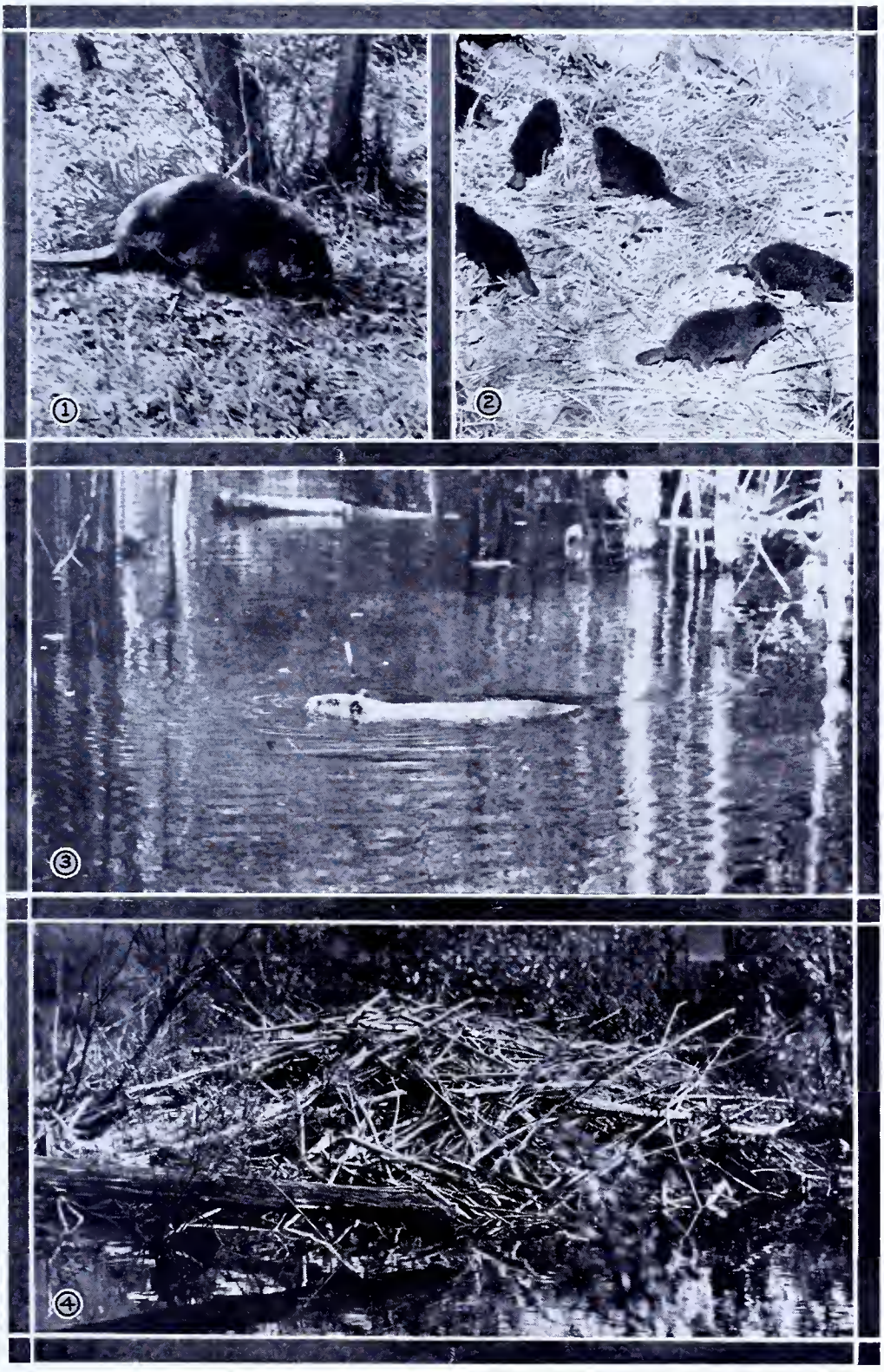

Fig. 1. Adult Beaver. Photo by Deck Lane. Fig. 2. Young Beavers. Photo by Norman McClintock. Fig. 3. Beaver swimming. Photo by Deck Lane. Fig. 4. Beaver House and Dam. Photo by Deck Lane.

Dr. Joseph Kalbfus reads "We are reliably informed there is still a colony of beaver in this state; they are found in the wildest portion of a wild section. A sufficient increase in their numbers might result in benefit to the state, and we recommend a law protecting this animal in the Commonwealth." The following year the Legislature passed such a law.

In the summer of 1917 the State of Wisconsin presented the Game Commission with a pair of beavers which were released on East Cowley Run, Cameron County. They increased rapidly, and in 1919 four additional pairs were purchased in Canada and stocked. During 1920, twenty-four more pairs were secured from Canada and liberated in various game refuges. Today there are over 1500 known colonies in 49 counties of the Commonwealth. Beavers are protected all year round.

An adult beaver, largest of North American gnawing mammals, may weigh 60 lbs. We have one record of a male weighing 84 pounds. The jaw muscles and chisel-like teeth are built for cutting wood. Beavers are aquatic; their hind feet are webbed, and their broad, hairless tails are excellent propellers and rudders. The front feet are not used in swimming. The throat and ears of a beaver are equipped with valves which involuntarily close when the animal dives, and open when they come to the surface.

The water furnishes protection and a highway for floating food and construction material for the dam and house. Often canals are built to float additional food to the home pond. Beavers prefer to live near stands of poplar or aspen, the bark, twigs and buds of which they eat. The bark-stripped branches are used to extend and strengthen the dam. Beavers never eat fish.

In building dams which provide deep water and maintain a constant water level, beavers certainly live up to their famous reputation as animal-engineers. Where there are high banks beavers often live in burrows along the stream. If the banks are low a dome-shaped house is built either along the bank or on an island in the pond. With the erection of the dam the stream bank is submerged, and the house is built upon an elevated portion of the bottom. The entrance to the house is always well beneath water level, for protection. The nest is above water level. The dam is built of sticks, roots, stones, grasses and mud, which are gathered and carried with the mouth and front feet. In autumn, twigs and bark are stored at the bottom of the pond so that when ice forms food will be available. Beavers work chiefly at night. If danger threatens, the Beaver warns the colony by whacking the water with its broad tail. Beavers often cut trees a foot or more in diameter.

In telling each other of their presence in a certain region, beavers build sign heaps or "mudpies," where they deposit musk upon mud secured from the bottom of the pond or stream.

The otter, which is equally at home in the water, is said to be the principal enemy of the beaver. In times of danger beavers dive to the bottom, where they have been known to remain nine and a half minutes.

The young, which are three to six in number, are born in May. When newly born, they weigh about a pound. The eyes are open and the teeth almost fully formed at birth. The gestation period is about three months. When the young beavers are born the old males are

driven away by the females lest they harm the offspring. Since the genital organs are within the body cavity, one cannot easily determine the sex of the beaver except in the case of adult females which have four teats between the fore legs. The young instinctively take to the water and within a few days seem to know how their teeth, feet, and tails are to be used. They must learn to dive before they can leave the house, for the only exit from the house is under water. They leave the house in about two weeks. They are very playful and active and are carefully guarded by their mother. The young, as well as their parents, constantly oil and comb their fur to keep it sleek and lustrous. The two oil glands are located under the skin in front of the rectum, as are the two castoreum sacs.

Due to the efforts of the Game Commission, beavers are now increasing rapidly in Pennsylvania. In capturing them for restocking purposes stout, cage-like traps are used. Beavers are easily handled and are not vicious as are most large mammals. Beaver dams conserve the water supply and furnish a hatchery for native fish and a breeding-ground for waterfowl. Trees preferred by beavers are not commercially valuable. Pennsylvania is wise in seeking to restore and protect this valuable fur-bearing animal.

PINE MARTEN: AMERICAN SABLE. *Martes americana americana* (Kerr).

The Pine Marten or American Sable is mink-like in appearance but slightly larger. It is orange-brown above with throat and breast more yellowish-orange. The top of the head, legs, and tail are warm brown. The soles of the feet are furry, and the tail bushy. The ears are large, upright and whitish inside. The legs are short, and there are five toes on each foot. The young number from six to eight and are said to be blind for a long time after birth. Martens nest usually in hollow trees.

The few records we have of the Marten (the latest of which was February 17, 1928) would indicate that the creature is virtually extinct. It is a splendid climber. It is almost altogether a creature of the dense forests, where it lives upon birds, squirrels, rabbits, mice and shrews. It travels about only at night.

FLYING SQUIRREL. *Glaucomys volans volans* (Linnaeus).

A small tree squirrel about ten inches long the name for which is derived by the hairy membrane which extends laterally from the front to the hind feet on both sides. By extending the arms and legs, this membrane is drawn taut and thus the creature has excellent powers of gliding. It does not fly, as many persons suppose. The tail is flat and broad with rounded tip. The eyes are large and the ears prominent.

In color the Flying Squirrel is yellowish-brown flushed with grayish above, and white below. The hair is very soft.

Several litters of from three to seven young are born from April until August. The gestation period is about 40 days. Mating takes place in our latitude during March.

Flying Squirrels eat nuts, seeds, berries, grain, buds, insects, and birds' eggs. The nest is usually in the cavity of a tree, and is lined with dried leaves. A number may live together in one tree. They are

active only at night. A Flying Squirrel makes a splendid pet. The flat tail is used as a horizontal rudder in changing the course of their glide when landing. They store up a winter supply of food but do not hibernate. Their chief enemies are foxes, weasels, and owls. They are not protected.

One of our records for the flying squirrel concerns the finding of a nest on top of a cupboard in a boat house owned by J. F. Robison of Coatesville, Chester County. Mr. Robison stated that when the creatures came out of the nest they were very cold. This record was established in March, 1928.

On August 28, 1930, a pair of Flying Squirrels nested in a cavity in an old dead stub near Dauphin, Dauphin County. Soon after they were comfortably established they were driven out by a pair of Screech Owls who appropriated the nest for themselves. Later a pair of Flickers came along and, believe it or not, routed the Screech Owls.

Numerous young Flying Squirrels were secured during the clearing up of the Pymatuning Dam area in Crawford County during the spring of 1932.

Northern Flying Squirrel. *Glaucomys sabrinus Macrotis* Mearns. Our only records for this form are those of Doutt (1930) for Potter County, and Green, during the same year, for Sullivan County.

THE SMALLER MAMMALS

There is so little known about our smaller mammals, that consequently the treatise on them is comparatively short. There is given, however, sufficient descriptive material to enlighten the beginner in nature study. In the near future, it is the intention of the Game Commission to conduct a study of the smaller mammals including the mice, rats, shrews and bats.

Many persons can help further this work by sending in from time to time specimens of any of the following mentioned mammals that come into their possession. It is only in this way that the proper classification and distribution of these little creatures can be definitely established.

As a rule a mouse is a mouse to the average person, and invariably every one of these creatures observed is referred to as "a field mouse." Most persons do not know that the name "field mouse" is merely a common one applied locally to the Meadow Mouse and allied forms.

Mice as a rule are very playful. Their numerous squeaks are full of expression and their tone inflections portray distress, anger, content, etc., in a manner that is easily recognized.

Although some mice are not as much of a problem economically as others, we should indeed be grateful for the hawks and owls, snakes, domestic cats, and for the four-footed predators which keep them in check. Concerning the mouse-eating propensities of some of our hawks and owls, records kept over a period of years show that these rodents constitute the chief diet of such species as the Marsh Hawk, Red-tailed Hawk, Red Shouldered Hawk, Sparrow Hawk, Barn Owl, Long-eared Owl, Short-eared Owl, Barred Owl, and Screech Owl. Of course other species of both hawks and owls including such game destroyers as the Goshawk, Cooper's Hawk and Great Horned Owl, vary their diet with mice.

Mice girdle hundreds of trees each year, and if the girdling is complete, the tree usually dies within a few months. They are very de-

structive to growing crops, and grains of all kinds are cut down and eaten. Much grain is also destroyed in the shock. Mice destroy all kinds of growing vegetables. Speaking of the meadow mice particularly, it has been stated by Bailey that as few as 10 of these rodents to the acre on 100 acres of meadow would take about 11 tons of grass, or 5½ tons of hay, a year.

Mice eat snails and crayfish and other meat diet. Parent mice, especially those held in captivity, often eat their young. Mice caught in traps have been eaten by their relatives before they could be removed.

The deer or white-footed mice subsist chiefly upon such foods as beechnuts, acorns, seeds, grains, etc. Their white underparts and white feet make them easily distinguishable from other forms. The tails are well haired. They are readily tamed and make amusing pets. As many as four litters have been reared during a year, the young ranging from three to five. New born mice are merely bits of pink flesh, blind and helpless. Their home is usually a remodeled bird-nest to which are added grasses and leaves. Sometimes they are some distance above the ground. They often nest about outbuildings, also. Deer mice are common about the hunting camps where they search for tid-bits of food. They are excellent climbers. Mice can easily be squeaked from their hiding places by kissing the back of the hand.

The Deer Mouse, *Peromyscus maniculatus gracilis* Le Conte, is common to the Alleghenies. It is beyond doubt the most beautiful and interesting of all our mice. It is dark brown tinged with yellowish above, white below. Tail, brownish black above, white below. It has a total length of over 7 inches, including the tail, which measures about 3¼ inches or about half. The ears are large and hairy; eyes large and lustrous.

The Cloudland Deer Mouse, *Peromyscus maniculatus nubiterrae* Rhoads, is noted only in the highest mountainous sections of the state. It is blackish-brown above, dirty white below. Total length about 7 inches; tail about 3½ inches, and quite hairy. The writer found an immature dead specimen on June 18, 1927, in the Cook Forest of Clarion County. A nest of young in gray pelage was also found on the same day. The nest was in an old woodpecker cavity of a long since fallen tree.

Fischer's Deer Mouse, *Peromyscus leucopus noveboracensis* Fischer, is found chiefly in the coniferous forests, although it is the common form over the greater part of the state. It is fawn color above, white below. Length about 6½ inches including a tail approximately 3 inches. We have several records of this species. A pair living under a platform not far from the Game Refuge Keeper's house at Keating Summit, Potter County, had a nest made of grasses, fur, and other soft material.

The clever little House Mouse, *Mus musculus* Linnaeus, is well known to everyone. To the little children, he is a principal character of the story book where he is usually pictured sitting near a great big cheese. The small size of the house mouse which measures only about 6 inches, makes it possible for it to squeeze through the tiniest of cracks and crevices about the house. It nests in almost any kind of a suitable hiding place, such as pockets of old coats, old shoes, etc. In color the house mouse is gray brown above; slate gray below. From eight to

ten are born every two or three months during a year. The nest is made of soft materials, sueh as hair, ehewed newspapers, and rags.

The Lemming Mouse, *Synaptomys cooperi cooperi* Baird, is eomparatively rare and is found only in boggy areas. It is often ealled Bog Mouse. The head is large, with long whiskers. It measures only about 5 inehes over all, the tail being about ¾ of an ineh. Above, it is ehestnut-brown; below, brownish-gray. The tail is brown above; white below. The ears are hardly noticeable above the fur. Although it elosely resembles the Meadow Mouse, it ean readily be distinguished by its grooved front teeth, however. There are 6 tubereles on the sole of the hind foot.

The Red-baeked Mouse, *Evotomys gapperi gapperi* (Vigors), with its rusty red back, buffy sides and belly, and gray feet, is eommon both to forest and field although it prefers the eool dampness of the latter. Its tail is brownish above, black-tipped grayish buff below. It builds its nest of grass and mosses in a ehamber along one of its runways, or under a log or pile of roeks. The young, whieh are three to eight in number have been noted from spring to fall. Several litters are raised. The Red-baek is related to the field mouse but is not quite as great a problem eeonomically as the latter speeies. It is both diurnal and nocturnal, and feeds on nuts and seeds, as well as twigs, roots, and bark. It stores mueh white elover and wild artiehokes. Length about 4½ inehes; tail, 1⅛ inches.

The Pine Mouse *Pitymys pinetorum scalopsoides* (Audubon and Bachman), is found in southern and southwestern Pennsylvania and derives its name from its burrowing habits. It is aetive both day and night, and, like the meadow mouse, lives in colonies. Several litters of four to six young are born each year. The nest is a cup-shaped basket of dried leaves and grasses built in a large chamber along one of their many tunnels, from which there are many openings to the surfaee of the ground. It is ehestnut brown above, grayish white below. It is about four inehes long, with very short tail. The ears are hardly pereeptible above the soft, dense fur. There are 5 tubercles on the sole of the hind foot. There is reason to think that this is the most destruetive of all our miee, although its work is mainly subterranean—henee unnoticed.

The Meadow or Field Mouse, *Microtus pennsylvanicus pennsylvanicus* (Ord), is our real misereant and a sore thorn in the side of all farmers, orehardists, and nurserymen. It is rendered more so beeause of its great abundanee everywhere. It almost always nests underground in a pocket along one of its tunnels where several litters of six to eight young are born eaeh year. The gestation period is about 21 days. Young are sometimes killed by the male or other members of the family. The nest is often lined with cat-tail down and the silky fluff of milkweed seeds. Nests built in tussoeks of grass in swampy areas are known as "nigger heads." The Meadow Mouse is about seven inehes long, ineluding the tail whieh about 1½ inehes. In summer the upperparts are ehestnut brown varying with the individual to yellow ehestnut, sprinkled with blaek along the baek. Underparts gray with dusky tinge, or washed with einnamon; feet brownish. The winter pelage is grayer. The tail is brown above, paler underneath. There are 6 tubercles on the sole of the hind foot. Its fur is practieally

waterproof. Its food consists of grasses, seeds, roots, grain, vegetables, etc. It stores many roots, tubers, and bulbs.

Other species of which there are only a few records, include the Rock Vole, *Microtus chrotorrhinus chrotorrhinus* Miller, and the Hudson Bay Jumping Mouse, *Zapus hudsonius hudsonius* (Zimmerman).

The Kangaroo or Jumping Mouse, *Zapus husonius americanus* (Barton) which resembles a miniature kangaroo and leaps about much like one, is yellowish-brown in color with a noticeable band of black down the back resulting from the long black outer-guard hairs. The under parts and feet are white. The tail is dark above (*tip dark*), white below, with few hairs. It is easily recognized by its very long hind legs and tail, and short fore legs. There are five toes on each foot, the soles of which are naked. Like the Chipmunk it has cheek pouches in which it can stuff much food. The tail may act as a prop much like the kangaroo's. It feeds chiefly upon green vegetation. It builds its home in shallow burrows, hollow trees, or under buildings, and the cupshaped nest is grass-lined. Several litters of from five to six young are born each year. Total length about 8 inches; tail 5 inches. This form is common to the southern half of the state, rare in the northern part, and absent in the mountains.

Woodland Jumping Mouse, *Napaeozapus insignis insignis* (Miller). This mouse, largest of the jumping forms, is of buff coloration, *with white-tipped tail.* It is about 10 inches long, including the tail which measures about six inches. It is active only at night, when it dines on small seeds, nuts, grasses and insects. It is perhaps rather rare, being reported from only a few counties in the northern and western part of the state.

RATS

The Black Rat, *Rattus rattus rattus* (Linnaeus), may be considered rare in Pennsylvania. It is smaller than the house rat and slaty black in color.

The Allegheny Wood or Cave Rat, *Neotoma pennsylvanica* Stone, is a creature of the caves and rocky crannies of our mountain regions. It is often called Pack or Trade Rat, Mountain Rat or Brush Rat. The name Trade Rat is derived from its habit of stealing anything it can conveniently carry and hiding it away. Hunters' cabins and summer cottages are ransacked by these curious creatures. The Wood rat is about sixteen inches long and is grayish buff above and whitish below. The hairy tail is white underneath. It has a long pointed nose with white whiskers, and large ears. Several litters of four to five young are born each year.

Heaped in or about the nest are often found all sorts of materials it has carried away. Even watches have been stolen by the little jokers. It feeds upon seeds, nuts, fruits, roots, twigs, etc., and in turn is fed upon by hawks, owls, weasels, foxes, snakes. It goes about usually at night and can climb trees readily. Dr. Thos. E. Winecoff, In Charge of Research for the Game Commission reports observing the wood rat storing up large quantities of mushrooms.

Norway Rat, *Rattus norvegicus* Erxleben. Other names commonly applied to the Norway Rat, locally, are the Brown Rat, Wharf Rat, Barn Rat, Gray Rat, House Rat, Common Rat, Domestic Rat. It is

grayish brown above, dirty white below. The scaly tail is almost naked. It is a good thing for man that the rats have so many enemies, such as the hawks and owls, snakes, weasels, domestic cats and dogs, foxes and others.

It measures about 15 inches and is probably the most destructive pest to be found anywhere. It is a disease carrier. Several litters of from 8 to 14 young are born each year. It is omnivorous in its food habits, even to the extent of eating wood, papers, books, and clothes. Of course, its principal diet is grains, meat, all sorts of food stuffs, birds' eggs, poultry, etc. The Norway Rat is not native to America, having been introduced about 1775. The parasites with which it is infested often spread to bubonic plagues, tuberculosis, typhoid fever, and other maladies.

The house rat is an aggressive animal but I have seen its viciousness turn practically to stark fear when the creature was confronted by a weasel. The Norway Rat lives in sewers, in holes in the ground, in damp musty areas about the ship docks, in mines, under porches and buildings, etc.

During a prolonged mine strike in the anthracite coal region of Pennsylvania, when the mules were removed from their underground stables and grain and feed were no longer accessible, great armies of rats emerged to plague the vicinity.

MOLES

Inasmuch as we almost never see these little creatures because they live in their underground tunnels most of the time, we often forget that they form such an interesting part of our mammal life. In our tramps about the countryside we are reminded of their presence by the ridges which form the roofs of their subterranean passageways, usually built near the surface of the ground.

Their home is a large chamber built along one of the numerous tunnels. This spacious "living-room" is lined with dried leaves and grasses. Here one, and perhaps several litters of young, ranging from three to five each, are born, usually in March or April. Moles are naked when born.

With arched back, long pointed snout, and greatly enlarged forefeet, which resemble paddles, and quickly and efficiently displace the earth, moles are unquestionably built for burrowing. Their eyes and ears are so small as to be practically invisible. The feet have five claw-bearing toes.

Moles have a soft velvety fur, the color of which is the same in both sexes, and can be brushed either backward or forward and retain its smoothness. The face and snout of the mole is merely a tapered portion of the main body which accounts for the almost indiscernible neck.

Moles are insectivorous and destroy many insects and their larvae, as well as earthworms, cutworms, inch worms, etc. Sometimes they eat mice.

The Common Mole, *Scalopus aquaticus aquaticus* (Linnaeus), is present everywhere east of the Alleghenies. It is blackish brown in color, often assuming a slaty appearance in sunlight. The feet and tail are whitish. The underparts are slightly paler than the upperparts and are usually tinged with brown on the chest. The Common Mole averages

FIG. 1. COMMON MOLE. PHOTO COURTESY OF PROF. H. S. WILLIAMS. FIG. 2. STAR-NOSED MOLE. COURTESY OF PROF. H. S. WILLIAMS. FIG. 3. WOODLAND JUMPING MOUSE. PHOTO BY PROF. H. S. WILLIAMS. FIG. 4. SHORT-TAILED SHREW. PHOTO BY H. S. WILLIAMS. FIG. 5. SILVER-HAIRED BAT. PHOTO COURTESY OF U. S. BIOLOGICAL SURVEY.

about seven inches in length, including the tail, which measures about an inch. The males are slightly larger than the females.

The Star-nosed Mole, *Condylura cristata* (Linnaeus), is easily recognized by the twenty-two fleshy tenacles arranged gear-like around the nose. In color it is blackish brown above with underparts browner and paler. The "Star" is reddish. Total length eight inches; tail about three inches. Present throughout the State, although there seem to be but few records from the southwestern part. (Mr. Harry VanCleve of the Department of Predatory Animal Control of the Game Commission found an adult specimen in perfect pelage along the road near Cove, Perry County, on November 4, 1927, and Dr. George M. Sutton found one which had probably been captured by a Marsh Hawk, lying dead on a fence post in the center of a cat-tail marsh near Geneva, Crawford County on September 16, 1925.)

The Brewer's or Hairytailed Mole, *Parascalops breweri* (Bachman), is about seven inches long including the tail, which measures an inch and is densely haired. It is blackish above merging into paler below. The Hairy-tailed Mole is common in the more mountainous sections of the state, and west of the Alleghenies. The Star-nosed Mole is also generally distributed, though not as common.

Moles often render golf links and lawns very unsightly, and their tunnels afford runways for mice, which also add their destructive agencies.

SHREWS

The smallest and perhaps the least known of our mammals are the Shrews. They are nocturnal in their habits and consequently we do not see them as often as do their winged enemies the hawks and owls and their four-footed enemies the weasels, foxes, skunks, etc. Snakes also prey upon the little shrews.

Shrews are rather mouse-like in general appearance. They have five toes on each foot. The snout is sharp and pointed, the eyes minute, ears small (but in some forms visible above the hair), body slender, and feet small and delicate. The tail is rather long and covered with hair. General color, brownish above, paler below. The feet are pinkish white. The shrew is lightning quick and is a terrible menace to field mice. It also eats many insects and sometimes vegetable matter.

Rock piles, hollow and fallen logs, and depressions in the ground all offer home-sites for the shrews. Little is known about their home-life, however, although they probably raise from three to five young, and no doubt several litters. They utter a bird-like twitter.

Shrews are bloodthirsty little predators vying with the weasel for laurels. They are fearless, and like the weasel, tackle prey much larger than themselves.

The Masked Shrew, *Sorex cinereus cinereus* Kerr, is about four inches long, including its scanty-haired tail, which measures slightly over an inch. It is chestnut-brown above, paler beneath. (Mr. Harry VanCleve of the Department of Predatory Animal Control of the Game Commission secured two fine specimens at Cook Forest, Clarion County, on October 25 and 29 in 1927). It is present throughout the State, although limited to the mountains.

Allegheny Long-tailed Shrew, *Sorex dispar* Batchelder. This shrew,

which is similar to the Smoky Shrew in color and size (readily distinguished by its long tail, however), has only been recorded once so far as I know, by Green (1930) from northwestern Luzerne County.

The Short-tailed Shrew or Mole Shrew, *Blarina brevicauda talipodes* (Gapper) (Say), is far more common than the Common Shrew, being found everywhere throughout the State. It is slate-colored above blending into an ashy gray below. Tail less than half the length of the body. The Short-tailed Shrew is about five inches long, including the tail which measures about an inch.

The Smoky Shrew, *Sorex fumeus fumeus* (Miller), ranges from four and a half to five inches in length including the tail which measures slightly over an inch. It is slate color above, more grayish below. It is well distributed in the mountainous sections.

Other shrews of which there are few records include the Marsh Shrew or Water Shrew, *Neosorex palustris albibarbis* (Cope), which lives in the regions of lakes and rivers . So far as records tend to show, however, it is found only in the northeastern part of the State. It is blackish above and whitish below, the upperparts being sparsely mixed with white-tipped hairs. It is six inches in length including the tail, which is about three inches long. Its food consists of insects and various forms of aquatic life.

The Little Mole Shrew or Little Short-tailed Shrew, *Cryptolis parvus* (Say), smallest of our native shrews, is dark brownish above blending into grayish underparts. It measures only a little over three inches.

BATS

To the average person bats are thought of not as mammals, but as weird looking birds, the presence of which represents, to the superstitious at least, some terrible castastrophe, someone's untimely end, or other equally unpleasant occurrence. They are said also to carry disease and bed-bugs, and to try to tangle themselves in people's hair, all of which are just so many fallacies.

On the other hand, bats are most beneficial, feeding as they do upon countless insects as they fly about at night. Their peculiar mouse-like bodies, and odd shaped wings subconsciously take us back thousands of years ago when creatures resembling them, only gigantic in size, were supposed to wander the earth.

Some bats hibernate, other migrate. During winter the hibernating bats are found in many of our caves where they cling to the walls like so many chimney swifts in an old chimney. The writer has often come across large numbers of bats in caves where they cling together in great bunches. They also inhabit barn lofts and attics. In the daytime they can be found under the eaves of houses.

Bats have tiny clinging feet and on the apices of the wings are tiny claws which greatly aid them in clinging. They have numerous sharp teeth. They consume thousands of mosquitoes, gnats and beetles.

The commonest of our bats is the Common Brown Bat, or Big Brown Bat, *Eptesicus fuscus fuscus* (Beauvois), which is dark brown above, paler beneath. The ears are blackish. It is about four and a half inches long. There are usually two young. It is generally distributed although there are few published records of it.

The Red Bat, *Nycteris borealis* (Müller), is light reddish-brown with

a white patch in front of each shoulder, and is a little over four inches long. The young number two to four. On April 12, 1929, Mr. Harry Campbell of 2509 Agate St., Harrisburg, Pa., caught a specimen in the Capitol Building, Harrisburg. The Red Bat is abundant everywhere and is apparently resident.

The Long-eared Brown Bat, *Myotis keenii septentrionalis* (Miller and Allen), also is a fairly common species over most of the State. This form. with small fox-like face, is dull olive brown in color.

Myotis sodalis, which is similar to The Little Brown Bat, is a common wintering species in such caves as Woodward and Penn's Cave, Centre County; Hipple Cave, Bedford County; and Aitkin Cave, Mifflin County.

The Little Brown Bat, *Myotis lucifugus lucifugus* (Le Conte), perhaps more common than the Big Brown Bat, and similarly colored is only about three and a half inches long. There are two young.

The Silver-haired Bat, *Lasionycteris noctivagans* (Le Conte), so named because of the whitish-tipped hairs that form a part of its varied brownish-black coloration, is found chiefly about marshy areas where it darts swallow-like over the water searching for floating insects. It is about four inches long.

Other bats with a more or less limited distribution are as follows: the Least Brown Bat, *Myotis subulatis leibii* (Audubon and Baehman) colored similar to the Little Brown Bat, and about the same size, is known, according to the records we have been able to secure, only from two specimens taken at Woodward Cave, Centre County, and Aitkin Cave, Mifflin County; the New York Pygmy Bat, *Pipistrellus subslavus obscurus* (Miller), about three and a half inches long, dull brown in color with black tipped ears; and the Georgia Pygmy Bat, *Pipistrellus subslavus* (F. Cuvier), about the same size as the above species, but having a more yellowish coloration. Pygmy bats have eighteen teeth in the lower jaw; sixteen in the upper. The Hoary Bat, *Nycteris cinerea* (Beauvois), while not abundant is generally distributed. It is about five inches long and is a mixture of light yellowish brown, dark brown, and white. There are two to four young. The Hoary Bat prefers to hang head downward from the twigs of trees during daytime. It has marvelous powers of flight, as revealed by the facts that if a mother has four young the combined weights of which exceed her own, she can easily carry them. Their wings are long and narrow, consequently the flight is very rapid.

On March 5, 1929, Mr. Scott Burgoon, of Harrisburg, caught one alive at the Masonic Lodge meeting rooms, after a strenuous chase which ended in his finding it in a paper water cup.

THE DOMESTIC CAT

There is no more ruthless destroyer of the smaller wild birds and animals than the prowling house cat. When it is properly fed it is likely not to become a serious menace, but when it is left to roam about the fields and woodlands and forced to subsist on whatever it may find, then woe unto the smaller ground-nesting birds and animals. There is no reason why the cat problem can not be overcome. If persons who dislike cats would resort to humane methods of getting rid of undesireable creatures, rather than dropping them from their auto-

mobiles in out-of-the-way places, the situation would be remedied very quickly.

The "summer residents" or "cottagers" who abandon their pets on their return to their homes also are to blame to a large extent. Many a summer community is devoid even of the most friendly song birds because of the great number of cats which are "forgotten."

The farmer who keeps a dozen or more half-starved cats about his farm has no sense of values at all. One or two well-cared-for cats will control all the mice about his barn and be content. When too many cats are present, most of them are bound to subsist on whatever wild birds and animals they can get, and invariably those that they kill are invaluable to the farmer.

DOGS

The dog that is kept well under control by its owner, and is not permitted to chase game out of season, is a desirable creature to have about. However, on account of bad treatment or lack of sufficient food, dogs often will run away, and in an effort to secure sufficient food to keep themselves alive will become ruthless murderers of our game. In many cases received by the Game Commission complaining that sheep have been killed by bears, investigations have revealed that the killing was done by dogs. The wild dog hunts in the broad light of day and is afraid of nothing, and hard to catch or trap. The sheep-killing dog is a cunning night marauder—a hypocrite by day but a bloody-minded murderer under cover of darkness. Numerous cases of dogs reverting to the wild, even to the extent of living and rearing their young in hollow logs, have been reported by officers of the Game Commission.

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